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333 Baldwin Road|Pittsburgh, PA 15205-1751

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Letter of Transmittal

Date: *12/3/2008* | Job No.: *071-522.0005*

Attention: *Marcia H. Haberman*

To:
U.S. Army Corps of Engineers
William S. Moorhead Federal Building
1000 Liberty Ave.
Pittsburgh, PA 15222-4186

RE:
Application for Section 404 Permit, Bailey Mine Coal Refuse Disposal Areas No. 5 & 6

We are sending you *attached* the following items:

☐ Shop drawings	☐ Prints	☐ Plans	☐ Samples	☐ Specifications
☐ Copy of letter	☐ Change order	☒ *Permit Application*		

Copies	Date	No.	Description
1	12/3/08		Application for Section 404 Permit, Bailey Mine Coal Refuse Disposal Areas No. 5 & 6

☒ For approval	☐ Approved as submitted	☐ Resubmit copies for approval
☐ For your use	☐ Approved as noted	☐ Submit copies for distribution
☐ As requested	☐ Returned for corrections	☐ Return corrected prints
☐ For review and comment	☐	
☐ FOR BIDS DUE		☐ PRINTS RETURNED AFTER LOAN TO US

Remarks: *Marcia,*
Attached is the Section 404 Application for the Bailey Mine Coal Refuse Disposal Areas No. 5 & 6 (LRP-2007-463). Please call me with any questions. Thank You.

Copy to

Signed: Michael L. Shema
Michael L. Shema

2007-463 Marcia

Haberman, Marcia H LRP

From: Haberman, Marcia H LRP
Sent: Thursday, February 19, 2009 5:50 PM
To: Suter, Ed; 'KerryKampfer@consolenergy.com'
Subject: Information Request for Bailey 5 & ^

Ed and Kerry,
I am preparing a public notice for the subject project and need the following:

1. 8 1/2 x 11 copy of figure 2, dated 12/3/08, the fill development plan for the site.
2. 8 1/2 x 11 topo pay showing the location of the proposed wetland mitigation site. Please ensure the map has the quad name on it. Also, should have the center lat and long for the area.
3. need same for the proposed AMD Presto-Sygan AMD project proposed for stream mitigation.
4. Please provide clarification as to what this project is. The project is titled the Bailey Mine Coal Refuse Disposal areas No. 5 and 6. However, the mapping I have, and reviewed for aquatic resources shows only site #5, as identified in the alternative analysis map submitted. Potential disposal site #6 is a separate site. Also, on page 1-3 of Section 1.0 of your application, block 21 discusses the 3 phases of site development for Area 5 over 7.5 to 13 years. The last paragraph talks about Area 6 in the future. Also, the aquatic resource maps, with the length of streams and acres of wetlands, submitted for my review only identify resources in area 5. If Consol is proposing to apply for a Department of the Army permit for the Disposal area identified on the AA as Area 6, then I will need that information also.

Please phone me if you would like to discuss, otherwise I will await the requested information before continuing with the public notice.
Sincerely,
Marcia

Haberman, Marcia H LRP

From: Suter, Ed [EdSuter@consolenergy.com]
Sent: Wednesday, February 25, 2009 1:12 PM
To: Haberman, Marcia H LRP
Cc: Kampfer, Kerry; Shema, Mike
Subject: RE: Information Request for Bailey 5 & ^

Attachments: Stream & Wetland Impact Plan 2A,2B,2C & 2D.pdf; Wetland Mitigation Location Map.pdf; Presto-Sygan Location Map.pdf

Stream & Wetland Impact Plan 2... | Wetland Mitigation Location Ma... | Presto-Sygan Location Map.pdf ...

Marcia: Attached per your request are the following:

1.) Stream and Wetland Impact Plan, Figure 2. This was split into four 8.5" x 11" B/W Plots. CEC tried to reduce this down to one 8.5" x 11" plot, but it was not very legible. Let me know if this splitting into four pieces will be OK. yes

2.) Wetland Mitigation Location Map 8.5" x 11" B/W plot with longitude/latitude and quad name.

3.) Presto-Sygan Location Map 8.5" x 11" B/W plot with longitude/latitude and quad name.

4.) The submitted permit application is for development of the Bailey Mine Coal Refuse Disposal Areas No. 5 and 6. The 5 and 6 designations follow in line with the existing Bailey Refuse Area designations i.e. 1, 2, 3 & 4. These areas correspond to Sites 5 and 14 in the Alternatives Analysis (AA). Refuse Area 5 includes Tributaries 32705, 32706, and their associated tributaries and wetlands. Refuse Area 6 includes UNT-OR and its associated tributaries and wetlands. The aquatic resources identified in the permit application are inclusive of both refuse areas. Site 6, as identified in the Alternatives Analysis, is not proposed for development under this application. The volumes of refuse and number of years identified in Block 21 of the permit application equate to total disposal capacity and operational life of the facilities. Therefore, the impacts to streams and wetlands will occur as part of the site preparation - prior to placement of refuse. For instance, construction of the sediment pond (Phase II) must begin in September 2009, so that subsequent site preparation activities can occur. The schedule is designed to have the refuse areas ready to accept refuse by 2013, so as not to impede production at the Bailey and Enlow Fork Mines.

Please let me know if you need anything additional or further explanation of Item #4.

Thanks. Ed Suter

From: Haberman, Marcia H LRP [mailto:Marcia.H.Haberman@usace.army.mil]

3. need same for the proposed AMD Presto-Sygan AMD project proposed for stream mitigation.
4. Please provide clarification as to what this project is. The project is titled the Bailey Mine Coal Refuse Disposal areas No. 5 and 6. However, the mapping I have, and reviewed for aquatic resources shows only site #5, as identified in the alternative analysis map submitted. Potential disposal site #6 is a separate site. Also, on page 1-3 of Section 1.0 of your application, block 21 discusses the 3 phases of site development for Area 5 over 7.5 to 13 years. The last paragraph talks about Area 6 in the future. Also, the aquatic resource maps, with the length of streams and acres of wetlands, submitted for my review only identify resources in area 5. If Consol is proposing to apply for a Department of the Army permit for the Disposal area identified on the AA as Area 6, then I will need that information also.

Please phone me if you would like to discuss, otherwise I will await the requested information before continuing with the public notice.

Sincerely,
Marcia

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APPLICATION FOR DEPARTMENT OF THE ARMY SECTION 404 PERMIT (33 CFR 325) BAILEY MINE COAL REFUSE DISPOSAL AREAS No. 5 AND 6 RICHHILL TOWNSHIP, GREENE COUNTY, PENNSYLVANIA

Prepared for:

CONSOL PENNSYLVANIA COAL COMPANY, LLC
1525 PLEASANT GROVE ROAD
P.O. BOX J
CLAYSVILLE, PA 15323

Prepared by:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
333 BALDWIN ROAD
PITTSBURGH, PENNSYLVANIA 15205

CEC Project 071-522.0005

December 3, 2008

2009 DEC -4 AM 10:54

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APPLICATION FOR DEPARTMENT OF THE ARMY SECTION 404 PERMIT (33 CFR 325) BAILEY MINE COAL REFUSE DISPOSAL AREAS No. 5 AND 6 RICHHILL TOWNSHIP, GREENE COUNTY, PENNSYLVANIA

Prepared for:

CONSOL PENNSYLVANIA COAL COMPANY, LLC
1525 PLEASANT GROVE ROAD
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333 BALDWIN ROAD
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CEC Project 071-522.0005

December 3, 2008

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Appendix E – Wetland Determination Data Forms and Photographs
Appendix F – PHMC Summary and Correspondence

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (33 CFR 325)	OMB APPROVAL NO. 0710-003

Public reporting burden for this collection of information is estimated to average 5 hours per response. including the time for reviewing instructions. Searching existing data sources. gathering and maintaining the data needed. and completing and reviewing the collection of information Send comments regarding this burden estimate or any other aspect of this collection of information. including suggestions for reducing this burden. to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports. 1215 Jefferson Davis Highway. Suite 1204. Arlington VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-003). Washington. DC 20503 Please DO NOT RETURN your form to either of those addresses Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401. Section 10; 1413. Section 404 Principal Purpose: These laws require permits authorizing activities in. or affecting. navigable waters of the United States; the discharge of dredged or fill material into waters of the United States. and the transportation of dredged material for the purpose of dumping it into ocean waters Routine uses: Information provided on this form will be used in evaluating the application for a permit Disclosure: Disclosure of requested information is voluntary If information is not provided. however. the permit application cannot be processed nor can a permit be issued

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the proposed activity An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO	2 FIELD OFFICE CODE	3 DATE RECEIVED	4 DATE APPLICATION COMPLETED

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME Consol Pennsylvania Coal Company LLC	8. AUTHORIZED AGENT'S NAME & TITLE (an agent is not required) Civil & Environmental Consultants, Inc.
6 APPLICANT'S ADDRESS P.O. Box J, 1525 Pleasant Grove Road Claysville, PA 15323	9. AGENT'S ADDRESS 333 Baldwin Road, Pittsburgh, PA 15205
7 APPLICANT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business 724-663-3034 (Ed Suter- contact)	10. AGENT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business 412-429-2324 (Michael Shema - contact)

11. STATEMENT OF AUTHORIZATION

I hereby authorize Civil & Environmental Consultants, Inc. to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Jonathan M. Pachter — APPLICANT'S SIGNATURE

12-3-08 — DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12 PROJECT NAME OR TITLE (see instructions)

Bailey Mine Coal Refuse Disposal Areas No. 5 and 6

13 NAME OF WATERBODY, IF KNOWN (if applicable) Unnamed Tributaries to Owens Run	14. PROJECT STREET ADDRESS (if applicable) N/A
15. LOCATION OF PROJECT Greene — COUNTY PA — STATE	

16 OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

Project is located in Richhill Township. The coordinates to the downstream end of Area #5 are ~39°56'52 81"N ~80° 25'12.34"W. Refer to Figure 1 for the site location map.

17. DIRECTIONS TO THE SITE

Refer to Additional Information (attached) MARK STANLEY 724-485-4498

markstanley@consolenergy.com

18 NATURE OF ACTIVITY (Description of project. Include all features)

Refer to Additional Information (attached)

19 PROJECT PURPOSE (Describe the reason or purpose of the project, see instructions)

Refer to Additional Information (attached)

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. REASON(S) FOR DISCHARGE

Refer to Additional Information (attached)

21 TYPE(S) OF MATERIAL BEING DISCHARGED AND THE AMOUNT OF EACH TYPE IN CUBIC YARDS

Refer to Additional Information (attached)

22. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED (see instructions)

Refer to Additional Information (attached)

23. IS ANY PORTION OF THE WORK ALREADY COMPLETE? YES ○ NO ◉ IF YES, DESCRIBE THE WORK

ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC WHOSE PROPERTY ADJOINS THE WATERBODY (If more than can be entered here, please attach a supplemental list)

Refer to Additional Information (attached)

25. LIST OF OTHER CERTIFICATIONS OR APPROVALS/DENIALS RECEIVED FROM OTHER FEDERAL, STATE, OR LOCAL AGENCIES FOR WORK DESCRIBED IN THIS APPLICATION

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building and flood plain permits.

26. Application is hereby made for a permit or permits to authorize the work described in this application I certify that the information in this application is complete and accurate I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Jonathan M. Poulter	12-3-08	Michael J. Shenner	12-3-08
SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly thorized agent if the statement in block 11 has been filled out and signed.

3 U.S.C Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United tates knowingly and will fully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, racticious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

SECTION 1.0
APPLICATION FOR
DEPARTMENT OF THE ARMY SECTION 404 PERMIT (33 CFR 325)
ADDITIONAL INFORMATION
BAILEY MINE COAL REFUSE DISPOSAL AREAS No. 5 AND 6
RICHHILL TOWNSHIP, GREENE COUNTY, PENNSYLVANIA
CONSOL PENNSYLVANIA COAL COMPANY LLC

Block 17 (Directions to the site):

- From Pittsburgh, Take I-79 South onto I-70 West
- Exit I-70 at the Chestnut Street exit
- Bear right off the exit ramp onto Rt. 40 East
- At the second traffic light turn right and follow to junction with Rt. 18
- Make a right onto Rt. 18 South and follow to the junction with Rt. 231
- Turn Right on Rt. 231 and follow this along Enlow Fork
- Where Rt. 231 turns right, continue going straight onto Rt. 3026 (past the Bailey Mine Preparation Plant) to the junction with Ackley Creek Road
- Turn left onto Ackley Creek Road and travel approximately 2.3 miles
- End at the mouth of Area 5 (blockaded by an orange construction gate)

Total drive time is approximately 1 hr and 15 minutes from Pittsburgh

Block 18 (Nature of Activity): Consol Pennsylvania Coal Company LLC (CPCC) proposes to expand coal refuse disposal areas at the Bailey Central Mine Complex (BCMC), which services the Bailey and Enlow Fork underground coal mines. Coarse and fine coal refuse, generated as a byproduct of the coal cleaning process, will be disposed of in two valley fills encompassing approximately 706 acres of the Owens Run watershed. These activities include placement of coal refuse and construction of appurtenant facilities including an overland conveyor, dams, access roads, and erosion and sedimentation control structures.

Block 19 (Project Purpose): CPCC operates the Bailey and Enlow Fork mines located in Washington and Greene Counties, Pennsylvania. Raw coal from these mines is processed at the BCMC and the clean coal is sold for use, primarily in electricity production. It is estimated that

mining of coal from the Bailey and Enlow Fork mines generates 1,050 direct jobs and 8,300 indirect jobs (*Frias and Rose, Department of Mineral Economics, Pennsylvania State University, The Impact of Coal on the US Economy, 1994*).

Raw coal from the mines must be cleaned in the preparation plant to remove impurities (e.g., rock, clay, and various minerals) before it is suitable for sale. Cleaning also reduces mineral impurities thereby reducing byproducts from coal combustion. The resultant coarse and fine waste is referred to as coal refuse. Coal refuse has no market value; therefore, it must be disposed of in an environmentally safe manner. Coal refuse generated by the BCMC currently is disposed in accordance with industry standards; fine coal refuse is pumped into a valley upstream of an impounding structure constructed of coarse refuse.

Coal refuse disposal facilities that service large mining operations have historically been, and continue to be, located in valleys. Valley fill sites not only provide the large capacity necessary for efficient disposal, but the nature of the valley allows mine operators to provide better environmental control of the disposal process by minimizing the affected area, utilizing natural barriers created by the valley (e.g., side slopes and head-of-hollow), and minimizing the number of hydrologic systems that are contacted.

The four existing coal refuse disposal areas at the BCMC consist of two slurry impoundments (CRDA Nos. 1 and 3) and two coarse refuse disposal areas (CRDA Nos. 2 and 4). At projected production rates, disposal capacity for fine coal refuse slurry will be exhausted in 2012. Coarse coal refuse disposal capacity will be exhausted by 2013, except for the storage volume available in the Area No. 3 cap. CPCC plans to keep the Area No. 3 pool open to provide water for the BCMC operations; therefore, additional disposal volume for coarse coal refuse will be needed before 2013. To continue to achieve long-term coal production goals for the BCMC, CPCC needs to provide for continued coal refuse capabilities past 2012. In order to accomplish this task, construction for the Phase II Sediment Pond needs to be initiated in September 2009.

Block 20 (Reason for Discharge): As described in Block 19, valleys are used for refuse disposal because of the geographic barriers they provide. Valleys also provide the maximum

storage capacity with the minimum footprint, thereby reducing the environmental impact they have on the region. Utilizing the valleys in CRDA Nos. 5 and 6 will require placement of coal refuse in several wetlands and streams. The resultant impacts are unavoidable given the location of the wetlands and the need for coal refuse disposal areas.

Block 21 (Types of Material Being Discharged and the Amount of Each Type): The initial phase of site development involves constructing an overland conveyor to transport coal refuse from the BCMC to the downstream end of Area 5. No jurisdictional wetlands or streams will be impacted during this phase of the project.

During the second phase of site development, an earthen sediment pond will be constructed at the downstream end of Area 5. These activities need to begin in September 2009, and will require placement of 165,000 cubic yards (cy) of material in 1.49 acres of wetland and 3,888 linear feet (l.f.) of stream.

used for dam for slurry impoundment

Phase III of the site development activities in Area 5 include construction of a slurry impoundment located immediately upstream of the proposed sediment pond. The remainder of Area 5 will be cleared, grubbed, and graded to prepare the site to accept coal refuse material. Area 5 will provide for approximately 52.7 mcy of coarse coal refuse disposal and 38 mcy of fine coal refuse disposal over 13 and 7.5 years respectively. These activities will impact the balance of the streams and wetlands in Area 5.

pile

The final phase of development is construction of the Area 6 coarse refuse disposal area and associated sediment pond that will provide for 15.4 mcy of coarse refuse disposal over 2 years. These activities will fill the streams and wetlands within Area 6.

Block 22 (Surface Area in Acres of Wetlands or Other Waters Filled): Construction of CRDA No. 5 & 6 will impact 5.68 acres of jurisdictional wetland and 25,835 lf of jurisdictional stream, including 8,625 linear feet of perennial, 15,960 lf of intermittent, and 1,250 lf of ephemeral. One open water habitat, totaling 0.052 acre will also be impacted. The impacts will result from construction of the impoundments, site preparation, and refuse placement. Runoff

from the site will be controlled during site development through the use of proper erosion & sedimentation controls and will be controlled during refuse placement by ensuring that the runoff is collected onsite and conveyed to detention basins before it is discharged to Owens Run. These facilities will be permitted under the Pennsylvania Department of Environmental Protection (PADEP) rules and regulations with regard to site construction.

Block 24 (Addresses of Adjoining Property Owners): All activities associated with development of CRDA No. 5 & 6 will be conducted on property that is currently owned or controlled by CPCC. The following table includes the owner name and addresses of all adjoining properties that are not owned or controlled by CPCC. Exhibit A shows the location of the adjoining properties.

Exemption #6 - Privacy

[redacted]

SECTION 2.0

ALTERNATIVES ANALYSIS

A report entitled, "*Bailey Central Mine Complex, Greene County, Pennsylvania, Alternative Analysis & Site Selection Study, for New Coal Refuse Disposal Area No. 5*", was prepared by Michael Baker Jr., Inc. and submitted to the Pittsburgh District U.S. Army Corps of Engineers in April 2007 and discussed during the agency coordination meeting and field inspection held on September 26, 2007. This report described the 14 alternative sites that were evaluated for their suitability in satisfying the project purpose and need and minimizing potential impacts. The evaluation criteria included storage volume, environmental impacts (streams and wetlands), endangered species, historic and archaeological sites, public roads, and dwellings. Please refer to the above referenced report for a description of the alternatives that were evaluated for this site.

A letter from the Pennsylvania Department of Environmental Protection was received on April 21, 2008, stating that, "A review of the above referenced Coal Refuse Disposal Site Selection report, accepted on April 18, 2007 and additional information received on November 29, 2007 has been completed. The selected Refuse Disposal Area Sites No. 5, No. 6, No. 7, and No. 14 are acceptable".

SECTION 3.0
ENVIRONMENTAL AND IMPACT ASSESSMENT

This environmental assessment has been prepared to describe jurisdictional waters in the project area, summarize the results of a functional assessment of streams and wetlands, and assess the effects that the proposed project will have on the aquatic environment. The environmental assessment consists of two parts. The first part describes existing natural resources on the proposed Bailey Coal Refuse Disposal Area (CRDA) site. The second part describes and evaluates the environmental impacts associated with development of the site.

3.1 DESCRIPTION OF EXISTING NATURAL RESOURCES

This section of the environmental assessment describes the existing natural resources present at the proposed CRDA, including: the environmental setting; an inventory, description and assessment of streams and wetlands; and other environmental benefits associated with water resources on the site.

3.1.1 Environmental Setting

The proposed CRDA is located in the Waynesburg Hills Section of the Appalachian Plateau Physiographic Province (PADCNR, 2000). The site consists of approximately 700 acres including the watersheds of two unnamed tributaries to Owens Run. The on-site streams drain to Owens Run, then into Enlow Fork, which drains into Wheeling Creek, a major tributary to the Ohio River.

The proposed project area encompasses semi-mature forest and old field habitat currently owned by CPCC. The downstream portion of Area 5 and the majority of Area 6 are covered by semi-mature forests, while the headwaters in Area 5 are primarily old fields and regenerating pastures.

CEC identified and delineated 25,835 linear feet of jurisdictional stream within the project area. Of this length, 8,625 feet of stream were delineated as perennial, 15,960 feet were delineated as

intermittent, and 1,250 feet were delineated as ephemeral (Table 3-1). The only perennial streams on the site were the downstream portions of Tributary 32705 to Owens Run (Area 5) and UNT-OR (Area 6). Eighty two jurisdictional wetlands totaling 5.68 acres were also identified within the project boundary. The wetlands consisted of 5.405 acres of palustrine emergent wetlands, 0.007 acre of palustrine emergent/scrub-shrub wetlands, and 0.268 acre of palustrine forested wetlands (Table 3-2).

3.2 STREAMS, WETLANDS, AND AQUATIC FUNCTIONS

3.2.1 Stream and Wetland Assessment Methods

CEC performed the following studies at the project site to identify and assess stream and wetland resources:

- A wetland and stream delineation study
- A stream biological assessment study
- A *Wetland Evaluation Technique 2.1* analysis of wetland functions and values

3.2.1.1 Wetland and Stream Delineation

CEC conducted the wetland delineation in August through September 2007. The delineation was based on CEC's professional judgment and interpretation of the technical criteria presented in the 1987 *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Corps Manual). Wetland boundaries were delineated using the routine onsite determination method described in the Corps Manual supplemented by the *National List of Plant Species That Occur in Wetlands: Northeast (Region 1)* (Reed 1988) and *Hydric Soils of the United States* (USDA 1991).

CEC conducted the stream delineation in January 2008, using a weight-of-evidence approach to evaluate physical and biological indicators of stream hydrology. CEC used field indicators such as flow, substrate composition, presence of defined bed and bank, origin of the source of stream hydrology, presence/absence of vegetation within the stream channel, and the composition and

relative abundances of resident stream invertebrates to classify on-site stream segments into perennial, intermittent, and ephemeral reaches.

The delineation report, dated April 10, 2008 and entitled, "*Wetland and Stream Delineation Report, Bailey Mine Coal Refuse Disposal Areas No. 5 and 6, Richhill Township, Greene County, Pennsylvania*", describes the delineation methods employed, stream types and lengths, wetland types and acreages, and provides documentation of the stream and wetland delineation in the form of field data forms, photographs, and surveyed wetland and stream boundaries on a delineation map.

On May 9, 2008, a jurisdictional determination meeting was held with Marcia Haberman from the Pittsburgh District of the Army Corps of Engineers and Joel Folman from the Pennsylvania Department of Environmental Protection California District Mining Office to verify the wetland boundaries. The wetland and stream limits were determined to be accurate with minor changes. A letter dated September 5, 2008 addresses revisions to the delineation report that were based on discussions during the jurisdictional determination meeting.

3.2.1.2 Stream Biological Assessment

On February 8, 2008, CEC performed biological sampling of perennial reaches of Tributary 32705 and UNT-OR. The biological assessment included habitat characterization and assessment, pebble counts, flow and water quality measurements, and benthic macroinvertebrate and fish sampling. Benthic macroinvertebrate sampling was performed in accordance with the procedures outlined in "Appendix B – PA DEP Low Gradient Stream Assessment Protocol" of the PADEP Technical Guidance Document (TGD) 563-2000-655, *Surface Water Protection – Underground Bituminous Coal Mining Operations* (PADEP 2005). The results of the stream biological sampling are discussed in Section 3.2.3.1 and the stream biological field data forms and photographs are included in Appendix A.

3.2.1.3 Functional Assessment

Ecological functions and values of streams and wetlands within the project area were evaluated in accordance with the aquatic functions listed in PADEP's Mining Permit Module 15 and on PADEP's Environmental Assessment Form (EAF). The Chapter 105 aquatic functions are summarized into six overall groups of functions, including description of aquatic community, habitat functions (food chain production, nesting, spawning, rearing, resting, migration, feeding, escape cover, and threatened and endangered species), hydrology functions (natural drainage patterns, flushing characteristics, current patterns, groundwater discharge, natural recharge areas, and floodwater/stormwater control), water quality functions (preventing pollution, sedimentation control and patterns, and natural water filtration), recreation functions (game species, non-game species, fishing, hiking, and nature observation), and environmental study areas (sanctuaries and refuges).

For streams, CEC used field evaluations and observations, stream delineation data, stream biomonitoring data, scientific literature regarding stream functions, and professional judgment to assign low, moderate, and high ratings to the Chapter 105 aquatic functions.

Wetland functional analysis was performed using a two-step process. First, the USACE *Wetland Evaluation Technique, Version 2.1* (*WET 2.1*) was used to assess wetland functions and values for a reference wetland for each combination, where they exist, of wetland landscape position categories (i.e., groundwater slope, low-gradient riparian, and high-gradient riparian), size class (<0.1 acre, 0.1-0.5 acre, and >0.5 acre), and Cowardin classification (i.e., PEM, PSS, PFO). The results of the *WET 2.1* (Table B-1) and the documentation for the reference wetlands used in the *WET 2.1* analysis are provided in Appendix B. The results of the *WET 2.1* analysis were then interpreted using site-specific data and observations to assign low, moderate, and high ratings to the Chapter 105 aquatic functions for each wetland functional class.

3.2.2 *WET 2.1* Results

The USACE developed *WET 2.1* as a means of assessing wetland functions and values by using a hierarchical key that uses descriptive characteristics of wetland form (e.g., size, land form, plant community structure, hydrology, etc.) to assign probability ratings of low, moderate, or high for each function or value. The results are based on the answers the assessor provides to a series of questions regarding the characteristics of the evaluated wetlands (Appendix B). The distinction between functions and values is that functions are the physical, chemical, and biological characteristics of a wetland and values are the characteristics that make a wetland beneficial to society.

WET 2.1 assesses a wetland's functions and values in the following three categories:

- Social Significance - Assesses the value of a wetland to society;
- Effectiveness - Assesses the capability of a wetland to perform a specified function; and
- Opportunity - Assesses the opportunity of a wetland to perform a function to its level of capability.

The following sections describe the *WET 2.1* results for each category and their consistency with site-specific data and observations regarding the wetland types present within the project area.

3.2.2.1 Social Significance

All wetlands within the project area were rated as low for social significance functions by *WET 2.1* (Table B-1, Appendix B), because they do not generally provide a high level of support for values beneficial to society, such as protecting harbors, fish spawning areas for sensitive species or commercial fisheries, commercial shellfish beds, recreation areas, or historically significant areas. This evaluation is consistent with the characteristics of the site and wetland characterization data collected during the wetland delineation study, jurisdictional determination, and impact assessment.

3.2.2.2 Effectiveness

The effectiveness parameters evaluated by *WET 2.1* include: groundwater recharge, groundwater discharge, floodflow alteration, sediment/toxicant retention, nutrient removal/transformation, and aquatic diversity/abundance. For some of these functions, *WET 2.1* yielded either higher or lower ratings than indicated by site-specific information.

Groundwater recharge and discharge functions were rated as low, by *WET 2.1*, for all functional classes of wetlands within the project area (Table B-1). However, when evaluating the resources on a local scale (i.e., Owens Run watershed), wetlands greater than 0.1 acre were generally assigned moderate to high rating because of their likely contribution in maintaining groundwater baseflow in Owens Run.

Conversely, *WET 2.1* ranked most of the wetlands as functioning at a high level for floodflow alteration (Table B-1). This is likely a result of the method's bias towards larger wetlands (i.e., size ranges available in *WET 2.1* are: less than 5 acres, greater than 40 acres, or greater than 200 acres). Thus, *WET 2.1* may not account for the very small (<0.1 acre) wetlands which were delineated on the site. In this instance, the results of *WET 2.1* were modified for wetlands <0.1 acre, which were assigned a low rating for their effectiveness in performing floodflow alteration.

Nutrient removal/transformation functions were rated as high, by *WET 2.1,* for all functional classes of wetlands within the project area (Table B-1). However, when evaluating these functions as a combination of size and opportunity, the overall ratings was low to moderate because of the limited sources (i.e., opportunity) of pollution.

WET 2.1, ranked the majority of the onsite wetlands as functioning at a low level for sediment/toxicant retention. However, the sediment control and pollution prevention parameters were ranked slightly higher (e.g., moderate) for wetlands greater than 0.1 acre because of their ability to anchor soil and maintain the water quality in Owens Run.

Evaluation of aquatic diversity/abundance is determined in *WET 2.1* based on the type of vegetation that is present within the wetland. *WET 2.1* rated this function as moderate for most of the groundwater slope wetlands and low for the remainder of the wetlands. This function matches best with the food chain production parameter that is discussed in Section 3.2.3.2. CEC evaluated this parameter slightly higher than *WET 2.1* for low-gradient riparian wetlands greater than 0.1 acre because of the species of plants growing in the wetland that are known to be valuable food sources for birds and small mammals of this region.

3.2.2.3 Opportunity

WET 2.1 evaluated opportunity for only two functions that coincide with the PADEP Chapter 105 aquatic functions - floodflow alteration and nutrient removal/transformation. *WET 2.1* ranked all wetlands as having a moderate opportunity to provide floodflow alteration. However, given the landscape position and lack of connectivity to the onsite streams, the ranking of groundwater slope wetlands modified to low for this function.

The results of WET 2.1 for nutrient removal/transformation opportunity were generally consistent with field observations of the onsite wetlands.

3.2.3 Stream and Wetland Functions

The following sections describe the existing ecological functions provided by the onsite aquatic resources. A summary of the stream ecological function assessment is provided in Table 3-3 and a summary of the wetland ecological function assessment is provided in Table 3-4.

3.2.3.1 Description of Aquatic Community

Streams

The main stem of Tributaries 32705, UNT-OR, and 32705A were the only streams within the project area that were classified as perennial. These streams supported 13-15 benthic

macroinvertebrate taxa, the majority of which are considered long-lived (i.e. univoltine or semivoltine). Included in these taxa were several families of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies).

The intermittent streams within the project area typically produced between 3 and 10 benthic taxa with the majority of taxa being assessed as Rare (0 to 3 organisms) or Present (4-10 organisms). Commonly collected taxa in these streams were Platyhelminthes (flatworms), Simuliidae (black flies), Chironomidae (midges), and Oligochaeta (aquatic worms). Ephemeral drainages generally lacked flow and did not support a benthic macroinvertebrate community.

Three biological sampling stations (BSW01, BSW02, and BSW03) were established within the project area. BSW01 is located approximately 100 feet north of Ackley Creek Road along Tributary 32705, BSW02 is located approximately 2,600 feet north of Ackley Creek Road along Tributary 32705, and BSW03 is located approximately 800 feet north of Ackley Creek Road along UNT-OR (Figure 2).

Twenty-two benthic macroinvertebrate taxa were identified from the 200±20% organism subsample for BSW01, which included eight EPT taxa of the insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), which are generally considered most sensitive to environmental stress and water quality degradation. The dominant taxon in this sample was the midge larvae (Chironomidae).

Table 3-5 shows the calculations for the five Appendix B metrics, which were used to compute a Total Biological Score for the Station BSW01 benthic macroinvertebrate community. The metrics computed for Station BSW01 showed that the benthic community had 22 total taxa, 4 Trichoptera (caddisfly) taxa, 9 intolerant taxa, and 9 filterer-collector plus predator taxa. EPT taxa comprised 36% of the total number of taxa. The Total Biological Score (TBS) computed from the five Appendix B metrics at BSW01 was 58.3.

Twenty benthic macroinvertebrate taxa were identified from the 200±20% organism subsample for BSW02, which included eight EPT taxa. The dominant taxon in this sample was the caddisfly genera (Neophylax).

Table 3-6 shows the calculations for the five Appendix B metrics and Total Biological Score for Station BSW02. Station BSW02 had 20 total taxa, 4 Trichoptera taxa, 9 intolerant taxa, and 8 filterer-collector plus predator taxa. EPT taxa comprised 40% of the total number of taxa. The Total Biological Score computed from the five Appendix B metrics at BSW02 was 56.8.

Thirty benthic macroinvertebrate taxa were identified from the 200±20% organism subsample for BSW03, which included 17 EPT taxa. The dominant taxon in this sample was the midge larvae (Chironomidae).

Table 3-7 shows the calculations for the five Appendix B metrics and Total Biological Score for Station BSW03. Station BSW03 had 30 total taxa, 5 Trichoptera taxa, 19 intolerant taxa, and 13 filterer-collector plus predator taxa. EPT taxa comprised 57% of the total number of taxa. The Total Biological Score computed from the five Appendix B metrics at BSW02 was 87.0.

Field water quality measurements, USEPA habitat scores, and pebble count data are presented in Table 3-8. The water quality measurements at all stations indicate that the streams are within the normal range of values considered to be capable of supporting aquatic life. Habitat evaluation scores at all three stations were within the "suboptimal" range. This is primarily attributable to evidence of bank instability and the resultant sediment deposition.

Only six fish, representing two species, creek chub (*Semotilus atromaculatus*) and blacknose dace (*Rhinichthys atratulus*), were collected at Station BSW01 during the electrofishing surveys. These species are listed as "pioneering" and "headwater" species respectively, which means that they are typically the first to inhabit a stream and are adapted to the conditions of small, shallow headwater streams. No fish were collected at stations BSW02 or BSW03.

Wetlands

The onsite wetlands fell into one of three Cowardin classifications: Palustrine Emergent (PEM), Palustrine Emergent/Scrub-Shrub (PEM/SS), or Palustrine Emergent/Forested (PEM/FO). Emergent wetlands commonly supported the following herbaceous species: sweetflag (*Acorus calamus*), rice-cut grass (*Leersia oryzoides*), arrow-leaf tearthumb (*Polygonum sagittatum*), boneset (*Eupatorium perfoliatum*), jewelweed (*Impatiens capensis*), and sedge species (*Carex spp.*).

The dominate shrubs growing in the PSS wetlands were spicebush (*Lindera benzoin*) and box elder (*Acer negundo*), while the dominant tree species in the PEM/FO wetlands was Norway spruce (*Picea abies*).

3.2.3.2 Habitat Functions

Food Chain Production

The main stem of Tributary 32705 and UNT-OR supported 22 and 30 benthic macroinvertebrate taxa respectively. The high productivity of the benthic macroinvertebrate community coupled with the presence of fish in Tributary 32705 was the basis for rating these streams high for food chain production. The 13 benthic macroinvertebrate taxa collected from Tributary 32705A indicate that it is relatively productive; however, its narrow width (2-3 feet) and short length (165 linear feet) limit it to functioning at a moderate level. The intermittent tributaries on the site typically supported between 3 and 10 benthic taxa with the majority of taxa being assessed as Rare (0 to 3 organisms) or Present (4-10 organisms); consequently, these streams were rated low for food chain production. Ephemeral tributaries lacked flow and benthic macroinvertebrate communities, for this reason ephemeral streams were rated low for food chain production.

Wetlands greater than 0.1 acre function at a moderate to high level for food chain production because they typically supported plants with edible seeds or roots that help support the feed behaviors of birds and small mammals. Additionally, these wetlands were covered by greater

than 90% native vegetation, to which native birds and mammals are adapted for foraging and food. Wetlands less than 0.1 acre do not produce edible seeds or roots in sufficient quantities to attract appreciable numbers of wildlife species; for this reason, small wetlands were rated low for food chain production.

Nesting

The perennial reaches of Tributary 32705 and UNT-OR, and intermittent streams located within forested watersheds were rated high for nesting due to the presence of mature riparian forest along most of the banks. Stream reaches with trees, shrubs, and dense herbaceous vegetation in the riparian zones are more likely to provide nesting functions for migratory birds and other stream and riparian dependent wildlife. Ephemeral tributaries and intermittent tributaries flowing through old field habitat lack the woody riparian vegetation that is required for the nesting behaviors of most birds; therefore, they were rated low for this function.

Palustrine emergent wetlands greater than 0.1 acre in size function at moderate levels for nesting functions because they provide dense herbaceous vegetative cover sufficient to provide habitat for small ground nesting mammals (e.g., moles, shrews, mice). Palustrine emergent/forested wetlands function at high levels for supporting the nesting behaviors of birds and tree-dwelling mammals (e.g., raccoons and opossums). Small (<0.1 acre) wetlands were rated low for this function because of their size and lack of woody riparian vegetation.

Spawning

The instream habitat along Tributary 32705 and UNT-OR is dominated by gravel and sand substrates that are suitable for fish spawning; however, the low relative abundance and species richness in Tributary 32705 indicate that the stream is not used as a primary spawning area. Moreover, several bedrock ledges (1-12 feet high) at the downstream end of both streams serve as barriers to fish passage. For these reasons, Tributary 32705 and UNT-OR were rated moderate for spawning. The remaining tributaries in the 32705 and UNT-OR watersheds are located upstream of the previously described bedrock ledges and are small tributaries that are not

likely to serve as spawning areas – a low rating was assigned to these streams. UNT 2 – OR is separated from Owens Run by a culvert and was also rated low for spawning.

The majority of the onsite wetlands are temporarily to seasonally saturated wetlands that lack standing water. For this reason, they are not likely to support the spawning behaviors of aquatic/semi-aquatic reptiles and amphibians – a low rating was assigned to these wetlands. The exception was Wetland 100, which is a relatively large depressional wetland located along Tributary 32705. Portions of this wetland were observed to have standing water during the site visits; therefore, it was assigned a moderate rating for this function.

Rearing

The perennial reaches of Tributary 32705 and UNT-OR were rated moderate for rearing habitat due to the presence of suitable instream cover and sustained flows; however, the remaining tributaries were rated low because of their lack of opportunity to support a fish community.

Palustrine emergent wetlands greater than 0.1 acre in size function at moderate levels for rearing functions because they provide dense herbaceous vegetative cover sufficient to provide habitat for small ground nesting mammals (e.g., moles, shrews, mice). Palustrine emergent/forested wetlands function at high levels for supporting the nesting behaviors of birds and tree-dwelling mammals (e.g., raccoons and opossums). Small (<0.1 acre) wetlands were rated low for this function because of their size and lack of woody riparian vegetation.

Resting

The presence of unfragmented forest surrounding the perennial reaches of Tributary 32705, UNT-OR, and intermittent streams in forested watersheds is likely to provide resting habitat for terrestrial and avian species. Ephemeral streams and intermittent streams located in old field habitat are not likely to provide unique habitats that would attract wildlife seeking resting areas. Consequently, these streams were rated low for resting functions.

Palustrine emergent wetlands greater than 0.1 acre in size function at moderate levels for resting functions because they provide dense herbaceous vegetative cover sufficient to provide habitat for small ground nesting mammals (e.g., moles, shrews, mice). Palustrine emergent/forested wetlands function at high levels for supporting the nesting behaviors of birds and tree-dwelling mammals (e.g., raccoons and opossums). Small (<0.1 acre) wetlands were rated low for this function because of their size and lack of woody riparian vegetation.

Migration

Migratory fish are not endemic to the Owens Run watershed and the onsite streams are unlikely to attract large aggregations of migrating waterfowl. However, the unfragmented forests in the Tributary 32705 and UNT-OR watersheds provide potential habitat for migratory neotropical songbirds; therefore, these streams were rated moderate for this function. Ephemeral streams and intermittent tributaries flowing through old field habitat were rated low because of their lack of water and/or woody riparian vegetation.

The onsite wetlands lack the open water habitat that would attract large aggregations of migrating waterfowl and the palustrine emergent wetlands lack woody vegetation that would attract migrating neotropical songbirds; therefore, most of the wetlands were rated low for this function. The exceptions are the Wetlands 8A and 100A, which are forested wetlands that abut contiguous tracts of forest that may be used by migrating songbirds. However, these wetlands represent a very small percentage of the total forest cover; therefore, they were rated moderate for this function.

Feeding

The high level of food chain production in Tributary 32705 and UNT-OR provide opportunity to support the feeding behavior of aquatic and semi-aquatic organisms, but because of the low number of predators (e.g., fish and salamanders) in the streams they were rated moderate for feeding functions. The moderate level of food chain production in Tributary 32705A is the basis for assigning it a moderate rating for feeding. The remaining intermittent and ephemeral

tributaries support limited benthic macroinvertebrate communities and consequently were rated low for feeding.

Based on the assessment of the wetland food chain production functions, the small (<0.1 acre) wetlands were rated low for feeding functions and wetland greater than 0.1 acre in size were rated moderate for feeding functions.

Escape Cover

The presence of unfragmented forest surrounding the perennial reaches of Tributary 32705, UNT-OR, and intermittent streams in forested watersheds is likely to provide escape cover for terrestrial and avian species. Ephemeral streams and intermittent streams located in old field habitat are not likely to provide unique habitats that would attract wildlife seeking escape cover. Consequently, these streams were rated low for this function.

Palustrine emergent wetlands greater than 0.1 acre in size function at moderate levels for escape cover functions because they provide dense herbaceous vegetative cover sufficient to provide habitat for small ground nesting mammals. Palustrine emergent/forested wetlands function at high levels for supporting escape cover for birds and small mammals. Small (<0.1 acre) wetlands were rated low for this function because of their size and lack of woody riparian vegetation.

Threatened and Endangered Species

A PNDI Project Environmental Review for the project area was conducted on November 10, 2008 (Appendix C). This search resulted in one potential impact under the jurisdiction of the Pennsylvania Department of Conservation and Natural Resources (DCNR). A pedestrian botanical survey of the project area was conducted by CEC biologists in July 2007. During this survey no species of special concern or their designated critical habitat were identified. A request for concurrence that the project will not impact species of special concern was sent to the

DCNR on November 10, 2008 (Appendix C). A copy of DCNR's response will be forwarded to the USACE upon receipt.

Mist net studies to determine presence/probable absence of the Indiana bat (*Myotis sodalis*) were completed for the project area during the summer of 2007. During this survey, one Indiana bat was identified foraging within the area. The DEP has determined that the Indiana bat is not "contained in" the permit area, as defined in 25 Pa. Code §90.202(e)(3). CPCC has notified the U.S. Fish and Wildlife Service (USFWS).

3.2.3.3 Hydrology Functions

Natural Drainage Patterns

Historic pasturing of the Tributary 32705 watershed has resulted in some areas of bank erosion and channel scour within the project area. It does not appear that there were significant alterations to the course of the onsite streams; therefore, they were rated moderate for natural drainage patterns. The course of the streams in the UNT-OR watershed do not appear to have been altered; therefore, they were rated high for this function. The continued mowing along UNT 2 – OR and the installation of culverts and an impoundment have significantly altered the drainage patterns in this stream; consequently, it was rated low for this function.

Low-gradient and high-gradient riparian wetlands greater than 0.1 acre in size function at a moderate to high level for maintaining natural drainage patterns because their depressional topography and moderate size allows them to slow surface water runoff, stabilize stream banks, and store stormwater. In contrast, groundwater slope wetlands are not located in the floodplain and are not depressional, thus limiting their ability to attenuate storm/floodwaters that can destabilize stream channels. All groundwater slope wetlands and small riparian wetlands were rated low for this function.

Flushing Characteristics

Flushing flows may occur seasonally in association with heavy precipitation, as evident from some moderate bank erosion and minor channel scouring along reaches of Tributaries 32705, UNT-OR, and 32706. Silt deposition in these streams was primarily limited to small pools and glides that have decreased water velocity. Therefore, the main stem of Tributary 32705, UNT-OR, and 32706 were assigned a moderate rating for flushing characteristics.

The remaining tributaries have small drainage areas (i.e., less than 100 acres) and have limited flushing flows in association with heavy precipitation. Therefore, all of these streams were assigned a low rating for flushing characteristics.

Flushing characteristics are not a function typically associated with wetlands; therefore, the onsite wetlands were not evaluated for this parameter.

Current Patterns

Current patterns are maintained in streams by flushing flows, stable channels, natural drainage patterns, and natural runoff rates. The large undeveloped watersheds in Tributaries 32705, UNT-OR, and 32706 allow these streams to maintain current patterns at moderate levels. The small drainage areas of the remaining tributaries limit them to functioning at low levels for maintaining current patterns.

Low-gradient and high-gradient riparian wetlands greater than 0.1 acre in size function at a moderate to high level for maintaining current patterns because their depressional topography and moderate size allows them to slow surface water runoff, stabilize stream banks, and store stormwater. In contrast, groundwater slope wetlands are not located in the floodplain and are not depressional, thus limiting their ability to attenuate storm/floodwaters that can destabilize stream channels. All groundwater slope wetlands and small riparian wetlands were rated low for this function.

Groundwater Discharge

Groundwater discharge and recharge functions in the onsite streams could not be adequately evaluated with existing data. Hydrologic studies on other similar streams in the vicinity of the project area have demonstrated the presence of alternating loosing and gaining stream reaches within the same stream, indicating both functions may occur in the same regional setting. Adjacent upland areas appear to be the primary groundwater recharge areas for these streams and hillside springs and seeps serve as the primary discharge areas.

The size and drainage areas of Tributaries 32705, UNT-OR, and 32706 suggest that groundwater discharge and recharge functions may occur at a moderate level for these streams. Conversely, the relatively low flows and drainage areas of the remaining streams suggest that they are functioning at a low level. The exception is Tributary 32705A, which originates at a spring and likely flows year round, thus allowing it to function at a moderate level for groundwater discharge.

Wetlands that lack depressional topography, have unrestricted outflows, and have a greater output than input are considered to be groundwater discharge points. Groundwater slope wetlands greater than 0.1 acre provide sufficient quantities of water to help maintain baseflows in the receiving streams, thus they were rated moderate to high for this function. Evidence of groundwater seepage along stream banks indicates that larger floodplain wetlands may also contribute to baseflow in receiving streams; therefore, they were rated moderate. Wetlands smaller than 0.1 acre were considered to function at a low level for groundwater discharge.

Natural Recharge Areas

Refer to the previous section on "Groundwater Discharge" for a discussion of stream recharge functions.

Generally, wetlands having depressional topography, a restricted outflow, and a greater input than output are considered to be recharge sites. The ability of a wetland to perform these

functions is largely dictated by its size and storage capacity. For these reasons, groundwater slope and small (<0.1 acre) riparian wetlands were rated as low, medium size (0.1-0.5 acre) riparian wetlands were rated as moderate, and large (>0.5 acre) riparian wetlands were rated as high for this function.

Floodwater and Stormwater Control

Numerous depressional wetlands were present along Tributary 32705. The density, size, and hydrologic connectivity of these wetlands provide floodwater attenuation and storage within or adjacent to the channel. Therefore, Tributary 32705 was rated high for the function of storm and flood water storage and control. UNT-OR follows through an undisturbed watershed and is hydrologically connected with its floodplain; however, the floodplain lacks numerous depressional wetlands – a moderate rating was assigned to this stream.

The relatively incised nature of Tributary 32706 and the high-gradient landscape surrounding the remaining tributaries limits their ability to retain flood water. These streams were rated low for floodwater and stormwater control.

Depressional riparian wetlands in the size range between 0.1 and 0.5 acre have the opportunity and ability to retain flood and storm waters and therefore were rated as moderate for this function. The added storage capacity and location, adjacent a second order stream, of the largest riparian wetland was the basis for rating it high for this function. The relatively small size of the remaining riparian wetlands limits their ability to significantly affect the flooding potential of the receiving stream and therefore these wetlands were rated low for flood and storm water control. Due to their landscape position, groundwater slope wetlands do not have the opportunity to provide these functions; consequently, they were rated low.

3.2.3.4 Water Quality Functions

Preventing Pollution and Natural Water Filtration

Pollution prevention and natural water filtration are broad categories of aquatic functions that include a variety of specific pollutant removal mechanisms, such as trapping sediments, removal and burial of metals and other toxic compounds, and biological transformation and degradation of nutrients and organic pollutants. The extent to which the stream assessment reaches provide these functions depends on the presence of extensive floodplains and riparian wetlands (with well-developed vegetation and depressional storage) and the degree to which these areas are connected to the stream channel.

Tributaries 32705 and 32705A have the ability to function at a high level for preventing pollution due to the presence of moderate size wetlands along their banks. However, there are not obvious sources of pollution within or upstream of the project area, so the opportunity for the streams to provide these functions is limited. Thus, the streams were rated moderate for this function. UNT-OR does not have the requisite wetlands adjacent the channel, but it also does not have any obvious sources of pollution, thus it was rated moderate for pollution prevention. All three streams provide a moderate level of water filtration via contact with alluvial substrates and streamside wetland vegetation.

The remaining tributaries lacked numerous streamside wetlands and have intermittent or ephemeral flow; therefore, they were rated low for the functions of pollution prevention and natural water filtration.

Vegetative cover and class, residence time, topography, and wetland size all influence a wetland's ability to retain and transform pollutants. Though the larger onsite wetlands have the ability to function at moderate to high levels, they are limited by opportunity due to the lack of chemical and organic pollution sources within the Tributary 32705 and UNT-OR watershed. For these reasons a moderate rating was assigned to the larger wetlands and a low rating was assigned to the smaller wetlands.

Sedimentation Control and Patterns

Sediment control functions consist of streambank anchoring and stabilization, dissipation of erosive forces, and trapping of sediments. In general, the presence of woody vegetation, root mats, boulders, and bedrock protect stream banks from scour and erosion and minimize sediment loading to the stream. Vegetative cover (e.g., herbaceous and scrub/shrub vegetation) within riparian wetlands or uplands along the stream can stabilize soils and trap sediments during overbank flooding. The ability of an area to provide sediment retention functions depends on the frequency and duration of flooding and storage capacity.

The majority of the onsite streams have either riparian wetlands, forest cover, or greater than 70% herbaceous cover along their banks, thus they were assigned a moderate rating for sedimentation control. Ephemeral tributaries only flow during periods of precipitation, when the scour/erosion potential is highest. Additionally, the steep gradient of these streams allows them to erode faster than the other onsite streams; therefore, ephemeral tributaries were rated low for sedimentation control.

Wetlands in the size range of 0.1-0.5 acre have dense vegetative cover and anchor soil over a large enough area to rate them as moderate for controlling sediment. Large low-gradient forested wetlands function at a high level for controlling sediment because of their surface area, depressional topography, and vegetative cover class. Wetlands less than 0.1 acre have a minimal impact on sediment control, thus they were rated low for this function.

3.2.3.5 Recreation Functions

The onsite streams are shallow headwater watercourses and do not provide opportunities for active recreation such as swimming, boating or kayaking. Other recreational values include hunting, fishing, hiking, and nature observation. The project site is privately owned and is not open to the public for these outdoor recreational uses. The adjacent properties are also privately owned and are not open to the public for hunting, fishing, hiking or plant observation. The public recreation value of the onsite streams and wetlands was rated low due to restricted access.

3.2.3.6 Environmental Study Areas

No sanctuaries or refuges are located within the project area; therefore, the value of the streams and wetlands on the site was rated low for these functions.

3.3 STREAM AND WETLAND IMPACTS

Development of the CRDA No. 5 & 6 will be completed in four phases (Figure 2). Phase I involves construction of an overland conveyor that will be used to transport coal refuse from the Bailey Preparation Plant to the downstream end of Area 5. Phase II includes construction of a sediment pond at the downstream end of Area 5. Phase III will be construction of an impoundment immediately upstream of the sediment pond. Following development of Phase III the site will be prepared to receive coal slurry which will eventually fill the refuse area to the elevations shown on Figure 2. The final phase (Phase IV) involves construction of a sediment pond and earthen impoundment, followed by placement of coarse refuse to the elevations shown on Figure 2. The grading that is shown outside of the permit boundary, on the northern end of the project area, is within previously approved coal refuse disposal area.

The following sections discuss the probable degree of cumulative impacts, for all four phases, that the project will have in the local (Owens Run) and regional (Enlow Fork) watersheds. Stream impacts will total 25,835 linear feet (l.f.) of jurisdictional streams, including 8,625 l.f. of perennial streams, 15,960 l.f. of intermittent streams, and 1,250 l.f. of ephemeral streams. Wetland impacts will total 5.68 acres, including 5.405 acres of palustrine emergent wetland, 0.007 acre of palustrine emergent/scrub-shrub wetland, and 0.268 acre of palustrine forested wetland. One open water habitat, totaling 0.052 acre will also be impacted.

3.3.1 Habitat Functions

Food Chain Production

The instream habitat, vegetation, substrates, and associated small, immobile or sedentary organisms within the perennial reaches of Tributaries 32705, UNT-OR, and 32705A will be lost within the impact areas, but there is no evidence that the vegetation or organisms within these habitats are critical or unique food resources to organisms outside the impact areas. Though the biota observed in the streams were common species, the loss of these organisms will reduce local food chain production and export to the aquatic community immediately downstream of the site; however, the loss is not anticipated to be significant in a regional context, because the combined watersheds of CRDA No. 5 & 6 only constitute about 1% of the total Enlow Fork Watershed. The remaining onsite tributaries were rated low for food chain production; therefore, the impact to this function was rated as low. status of remaining 99%

The majority of the larger wetlands are functioning at moderate to high levels for food chain production. Construction of the CRDA No. 5 & 6 area will eliminate these wetlands and their associated functions, thus it is anticipated that this will have a moderate impact on the local ecosystem. However, the functions provided by these wetlands are not unique resources in a regional context and are unlikely to have a significant impact on plants and animals of the region. Small riparian and groundwater slope wetlands currently function at a low level for food chain production; consequently, the impact is anticipated to be low in both a local and region context. based on what

Nesting, Spawning, and Rearing

Loss of forested riparian habitat along the banks of Tributary 32705 and UNT-OR and their tributaries is likely to have an impact on the nesting behaviors of avian species at the point of impact. However, large blocks of unfragmented forest will remain undisturbed in the vicinity of the project, so there is likely to be a low impact to nesting behaviors within the Enlow Fork

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watershed. Ephemeral tributaries and intermittent tributaries in old field habitat were rated low for nesting habitat and therefore the impact to this function will be low.

Perennial reaches of Tributaries 32705 and UNT-OR were rated moderate for spawning and rearing and therefore are likely to see a moderate impact to these functions in the locality of the construction activities. The remaining tributaries make minimal if any contribution to spawning and rearing; therefore, the impact to these functions will be low.

The majority of the onsite wetlands do not provide habitat that is suitable for the spawning behaviors of reptiles and amphibians; therefore, loss of these resources will likely have a negligible effect on wildlife in the vicinity of the project.

Nesting and rearing functions of wetlands greater than 0.1 acre were rated as moderate to high; consequently the impacts may affect the nesting and resting behaviors of avian species at the point of impact. However, large blocks of unfragmented forest will remain undisturbed in the vicinity of the project, so there is likely to be a low impact to nesting behaviors within the Enlow Fork watershed.

Migration

The lack of migratory fish species in the Owens Run watershed and the low potential for use by migratory waterfowl suggests that there will be a low impact to these animals. Despite, the clearing of forested habitat in the locality of the project, there will be large tracts of contiguous forest that remain; therefore, no significant impact to the migratory behavior of neotropical songbirds is anticipated.

Feeding, Resting, and Escape Cover

Tributaries within forested landscapes are likely to experience a moderate impact to the feeding, resting, and escape cover functions in the immediate vicinity of the project, but these are not anticipated to have measurable effect in a regional context. The remaining tributaries were rated

low for all three functions and consequently loss of these resources is likely to have a low impact.

Wetlands greater than 0.1 acre were generally rated as providing these functions at moderate levels. However, the classes of animals that were used to make this determination (e.g., birds and small mammals) are relatively mobile and can relocate to adjacent undisturbed habitats; therefore, loss of these species is anticipated to be low. Wetlands less than 0.1 acre are providing these functions at low levels; consequently, loss of these wetlands will likely have a negligible effect on the wildlife behavior.

Threatened and Endangered Species

Rare, threatened, or endangered plants were not identified within the project area; therefore, no impact to these types of plants is anticipated. Also refer to response in Section 3.2.3.2.

3.3.2 Hydrology Functions

Natural Drainage Patterns

All streams within CRDA No. 5 & 6 will be filled; thus, natural drainage patterns of the affected streams will be affected. However, the quantity of surface water discharged from the site is not expected to be significantly altered and impacts to natural drainage patterns from the project are not expected to have a significant effect on the Enlow Fork watershed because the contributory drainage area of CRDA No. 5 & 6 is only about 1% of the Enlow Fork watershed.

Larger riparian wetlands were rated as moderate to high for maintaining natural drainage patterns of the streams within the project area. However, these wetlands play a minor role in maintaining the natural drainage patterns of Enlow Fork, thus there is not likely to be a measurable effect on the Enlow Fork watershed.

Flushing Characteristics and Current Patterns

Flushing flows occur in onsite streams in association with heavy precipitation. Tributaries 32705, 32706, and UNT-OR were assigned a moderate rating for this function based on their drainage areas. Installation of rock drains on these streams and development of the sediment ponds will affect flushing characteristics and current patterns at the point of impact. However, installation of perforated risers will help to maintain the flushing characteristics in Owens Run during lesser storm events and should only have a moderate effect on this stream. The remaining tributaries were rated low for flushing characteristics due to their relatively small drainage areas and consequently will have a low impact on the receiving streams.

Construction of rock drains and sediment ponds will control current patterns immediately upstream and downstream of the installations. However, water will be collected in the sediment pond and released at a rate that will maintain the flow requirements of downstream receptors.

Larger riparian wetlands help control the current patterns of the streams within the project area. Because the flow exiting the valleys will be governed by perforated risers, loss of these wetlands is not likely to have a significant effect on the flushing characteristics of streams outside of the project area.

Groundwater Discharge and Recharge

Groundwater recharge will be reduced by altering the surface drainage at the proposed site; however, stormwater runoff from these areas will be returned to the downstream portions of Tributary 32705 and UNT-OR after it passes through the sediment ponds. Based on the size of the site, the project may have a moderate effect on the local watershed, but no significant impacts to groundwater discharge and recharge are expected in the Enlow Fork watershed.

Floodwater and Stormwater Control

The perennial reaches of Tributaries 32705 and UNT-OR were assigned high and moderate rating, respectively, for these functions due to the presence of numerous wetlands within the floodplains of these streams. The wetland impacts will affect the flood water storage function; however, the proposed sediment ponds will provide floodwater attenuation and storage and will minimize impacts on adjacent properties. The sediment ponds will remain in place after reclamation and serve as permanent stormwater detention ponds servicing CRDA No. 5 & 6.

The remaining tributaries lacked large stream side wetlands and were rated low for this function; therefore, the impacts to these streams was also rated as low.

3.3.3 Water Quality Functions

Preventing Pollution and Natural Water Filtration

Tributaries 32705, UNT-OR, and 32705A were assigned a moderate rating for these functions based on the numerous wetlands within the floodplains of onsite streams. Removal of wetland vegetation and soils will likely have a localized effect on the water quality improvement functions provided by these streams; however, the impact will be partially offset by the use of best management practices and the execution of the E&S pollution control plan that will minimize temporary impacts to water quality during construction.

The remaining tributaries lacked numerous stream side wetlands and were rated low for this function. Therefore, the impacts to these stream functions were also rated as low.

Loss of the natural water filtration and pollution prevention functions provided by wetland vegetation and soils may have a moderate impact on water quality in a local context, but is not anticipated to have a significant impact in a regional context.

Sedimentation Control and Patterns

Perennial and intermittent streams were rated as moderate for sedimentation control because of the presence of wetlands, forested riparian zones, and/or dense herbaceous vegetation. Loss of these habitats will have a moderate impact on sedimentation control; however, this loss will be offset by construction of the sediment pond which is specifically designed to control the release of sediment laden runoff.

Ephemeral streams and UNT 2 – OR lacked wetlands and forested riparian zones and are currently functioning at a low level for sedimentation control; consequently, impacts to these streams will have a low impact on this function.

3.3.4 Recreation Functions

The site is not publicly accessible for recreational activities; therefore, development of this area will not affect its recreational value.

3.3.5 Environmental Study Areas

The proposed project site is not located within or adjacent to any known environmental study areas and the proposed project is not expected to impact environmental study areas.

DRAWN BY: CLC

CHECKED BY: MLS

APPROVED BY: MRH*

SCALE: 1" = 3,500'

DATE: 12/3/2008

0 1,750 3,500 5,250 7,000 Feet

Legend

Project Boundary

Restoration/Mitigation Areas

*Hand signature on file.

ISSUED FOR: CONSOL ENERGY

ISSUED BY:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
333 Baldwin Road
Pittsburgh, PA 15205-9702
1-800-365-2324
Columbus, OH * Cincinnati, OH * Indianapolis, IN * Nashville, TN * Chicago, IL * St. Louis, MO * Export, PA
Detroit, MI * Phoenix, AZ

STREAM AND WETLAND MITIGATION LOCATION MAP
BAILEY CRDA NO. 5 AND 6
CONSOL PENNSYLVANIA COAL COMPANY LLC
GREENE COUNTY, PENNSYLVANIA

PROJECT NO.: 071-522.0005

FIGURE: 3

J:\Projects\2007\071522\maps\404_permit_areas_5_6\071522_overall_site_locations_11_20_08.mxd - 12/2/2008 @ 10:48:27 AM

TABLES

TABLE 3-1
Stream Impact Summary
Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

Stream Name	Stream Length (linear feet)			
	Perennial	Intermittent	Ephemeral	Total
32705 (141 l.f. **)	5,580	2,504	352	8,436
32705A	165			165
32705B		43		43
32705C*		1,222		1,222
32705C-1*			240	240
32705C-2*			132	132
32705C-3*			283	283
32705C-4*			105	105
32705C-5*			182	182
32705E		66		66
32705F		2,397	40	2,437
32705F-1**			312	312
32705F-2*			324	324
32705F-3**			100	100
32705F-4		287		287
32705F-5**			156	156
32705F-6		336		336
32705F-7		125	128	253
32705G**			506	506
32705H		1,109	154	1,263
32705H-1**			53	53
32705H-2**			53	53
32705I		265		265
32705J		9		9
32705K (101 l.f. *)		179		179
32705L		347	84	431
32705M		47		47
32705N		47		47
32705O		164		164
32705P		16		16
32705Q**			258	258
32705R**			176	176
32705S		13		13
32706		3,651		3,651
32706A		497		497
32706B		74	92	166
32706C		49		49
32706D**			71	71
32706E		629		629
32706E-1		548	162	710

TABLE 3-1
Stream Impact Summary
Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

Stream Name	Stream Length (linear feet)			
	Perennial	Intermittent	Ephemeral	Total
32706E-2		58	45	103
32706E-3		248		248
32706E-4**			129	129
32706E-5**			124	124
32706F			50	50
32706G		365		365
32706H**			184	184
32706I**			198	198
32706J**			146	146
UNT-OR (137 l.f. **)	2,880	731	222	3,833
UNT-OR A		44		44
UNT-OR B		64		64
UNT-OR C*		49		49
UNT-OR D		287	45	332
UNT-OR E		317		317
UNT-OR F**			154	154
UNT-OR G*			118	118
UNT-OR H*			154	154
UNT-OR I**			73	73
UNT-OR J		164		164
UNT-OR K			154	154
UNT-OR L**			31	31
UNT-OR M**			33	33
UNT-OR N		93		93
UNT-OR O*			59	59
UNT-OR P**			204	204
UNT-OR Q**			208	208
UNT2-OR		288		288
UNT3-OR A*			212	212
Total Stream Length	**8,625**	**17,332**	**6,506**	**32,463**
Isolated Stream Length	**0**	**1,372**	**1,809**	**3,181**
Non-Jurisdicitional (Post-Rapanos) Stream Length	**0**	**0**	**3,447**	**3,447**
Total Jurisdictional Stream Length	**8,625**	**15,960**	**1,250**	**25,835**

*As discussed during the field verification meeting with the USACE and DEP, it is CEC's professional opinion that these wetlands lack a hydrologic connection to jurisdictional waters and, thus, should not be considered jurisdictional by the USACE.

**As discussed during the field verification meeting with the USACE and DEP, it is CEC's professional opinion that these areas lack a significant nexus as specified under the Rapanos guidance and, thus, should not be considered jurisdictional by the USACE

TABLE 3-2
Wetland Impact Summary
Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

Wetland Name	Classification		Impacted Wetland Acreage
	Cowardin (NWI)	Brinson (HGM)	
Wetland 1	PEM	LGR	0.132
Wetland 2	PEM	LGR	0.109
Wetland 3	PEM	LGR	0.041
Wetland 3A	PEM	LGR	0.033
Wetland 3B	PEM	LGR	0.009
Wetland 4	PEM	LGR	0.028
Wetland 5	PEM	LGR	0.013
Wetland 5A	PEM	LGR	0.011
Wetland 5B	PEM	LGR	0.039
Wetland 5C	PEM	LGR	0.034
Wetland 6	PEM	LGR	0.099
Wetland 6A	PEM	LGR	0.069
Wetland 7	PEM	LGR	0.033
Wetland 7A	PEM	LGR	0.006
Wetland 7B	PEM	LGR	0.015
Wetland 7C	PEM	LGR	0.009
Wetland 8	PEM	LGR	0.288
Wetland 8A	PFO	LGR	0.162
Wetland 8B	PEM	LGR	0.029
Wetland 9	PEM	LGR	0.122
Wetland 10	PEM	LGR	0.033
Wetland 11	PEM	LGR	0.161
Wetland 11A	PEM	LGR	0.057
Wetland 12	PEM	LGR	0.053
Wetland 13	PEM	HGR	0.025
Wetland 13A	PEM	GWS	0.064
Wetland 13B	PEM	HGR	0.024
Wetland 14	PEM	GWS	0.013
Wetland 15*	PEM	GWS	0.041
Wetland 15A*	PEM	GWS	0.008
Wetland 15B*	PEM	GWS	0.003
Wetland 16	PEM	GWS	0.140
Wetland 16A*	PEM	GWS	0.017
Wetland 16B	PEM	GWS	0.011
Wetland 17	PEM	LGR	0.078

TABLE 3-2
Wetland Impact Summary
Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

Wetland Name	Classification		Impacted Wetland Acreage
	Cowardin (NWI)	Brinson (HGM)	
Wetland 18	PEM	GWS	0.310
Wetland 19	PEM	LGR	0.008
Wetland 19A	PEM	LGR	0.012
Wetland 20	PEM	GWS	0.055
Wetland 21	PEM	HGR	0.056
Wetland 21A	PEM	HGR	0.028
Wetland 22	PEM	HGR	0.020
Wetland 23	PEM	HGR	0.330
Wetland 23A*	PEM	GWS	0.005
Wetland 24	PEM	HGR	0.169
Wetland 25	PEM	HGR	0.071
Wetland 26	PEM	HGR	0.034
Wetland 27*	PEM	GWS	0.050
Wetland 100	PEM	LGR	0.517
Wetland 100A	PFO	LGR	0.106
Wetland 101	PEM/SS	LGR	0.007
Wetland 102	PEM	HGR	0.008
Wetland 103	PEM	GWS	0.044
Wetland 103A	PEM	GWS	0.013
Wetland 104	PEM	HGR	0.013
Wetland 104A	PEM	HGR	0.043
Wetland 104B	PEM	HGR	0.003
Wetland 104C	PEM	HGR	0.025
Wetland 105	PEM	HGR	0.035
Wetland 105A	PEM	HGR	0.005
Wetland 106	PEM	HGR	0.043
Wetland 107	PEM	GWS	0.032
Wetland 107A*	PEM	GWS	0.013
Wetland 108	PEM	LGR	0.096
Wetland 108A	PEM	LGR	0.008
Wetland 109	PEM	HGR	0.066
Wetland 110	PEM	HGR	0.045
Wetland 110A	PEM	HGR	0.051
Wetland 111	PEM	HGR	0.007
Wetland 112	PEM	HGR	0.035

TABLE 3-2
Wetland Impact Summary
Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

Wetland Name	Classification		Impacted Wetland Acreage
	Cowardin (NWI)	Brinson (HGM)	
Wetland 112A	PEM	HGR	0.007
Wetland 113	PEM	GWS	0.050
Wetland 114	PEM	HGR	0.023
Wetland 115	PEM	HGR	0.036
Wetland 116	PEM	HGR	0.027
Wetland 116A	PEM	HGR	0.036
Wetland 117	PEM	LGR	0.008
Wetland 118	PEM	LGR	0.100
Wetland 119	PEM	GWS	0.068
Wetland 120	PEM	HGR	0.008
Wetland 121	PEM	HGR	0.021
Wetland 122	PEM	HGR	0.014
Wetland 123	PEM	GWS	0.154
Wetland 123A*	PEM	GWS	0.001
Wetland 124*	PEM	GWS	0.003
Wetland 125	PEM	GWS	0.042
Wetland 126	PEM	GWS	0.019
Wetland 127	PEM	GWS	0.056
Wetland 128	PEM	GWS	0.104
Wetland 128A*	PEM	GWS	0.008
Wetland 129	PEM	GWS	0.644
Wetland 129A*	PEM	GWS	0.011
Wetland 129B*	PEM	GWS	0.023
Wetland 129C*	PEM	GWS	0.006
Wetland 130	PEM	LGR	0.029
		Total Wetland Acreage	**5.87**
		Isolated Wetland Acreage	**0.19**
		Total Jurisdictional Wetland Acreage	**5.68**

*As discussed during the field verification meeting with the USACE and DEP, it is CEC's professional opinion that these wetlands lack a hydrologic connection to jurisdictional waters and, thus, should not be considered jurisdictional by the USACE.

COWARDIN
PEM - Palustrine Emergent Wetland
PSS - Palustrine Scrub/Shrub Wetland
PFO - Palustrine Forested Wetland

BRINSON
GWS - Groundwater Slope Wetland
LGR - Low-Gradient Riparian Wetland (0.1-3% Slope)
HGR - High-Gradient Riparian Wetland (>3% Slope)

TABLE 3-3
Stream Ecological Function Assessment
Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

FUNCTION	Streams within Permit Boundary				
	Perennial Reaches of Tributary 32705 and UNT-OR*	Tributary 32705A	Intermittent Tributaries in Forested Watersheds and Tributary 32706*	Intermittent Tributaries in Old Field Habitat	Ephemeral Tributaries and UNT 2 - OR*
HABITAT FUNCTIONS					
Food Chain Production	H	M	L	L	L
Nesting	H	H	H	L	L
Spawning	M	L	L	L	L
Rearing	M	L	L	L	L
Resting	M	M	M	L	L
Migration	M	M	M	L	L
Feeding	M	M	L	L	L
Escape Cover	M	M	M	L	L
Habitat for Threatened and Endangered Species	M	M	L	L	L
HYDROLOGY FUNCTIONS					
Natural Drainage Patterns	M/H*	M	M	M	M/L*
Flushing Characteristics	M	L	L/M*	L	L
Current Patterns	M	L	L/M*	L	L
Groundwater Discharge for Baseflow	M	M	L/M*	L	L
Natural Recharge Area for Ground and Surface Waters	M	L	L/M*	L	L
Flood and Stormwater Control	H/M*	L	L	L	L
WATER QUALITY FUNCTIONS					
Preventing Pollution	M	M	L	L	L
Sedimentation Control and Patterns	M	M	M	M	L
Natural Water Filtration	M	M	L	L	L
RECREATION FUNCTIONS					
Game Species	L	L	L	L	L
Non Game Species	L	L	L	L	L
Fishing	L	L	L	L	L
Hiking	L	L	L	L	L
Observation (plant/wildlife)	L	L	L	L	L
ENVIRONMENTAL STUDY AREAS					
Sanctuaries	L	L	L	L	L
Refuges	L	L	L	L	L

L = Low: Indicates that resource is ranked as having a low ability to provide the specified ecological function.
M = Moderate: Indicates that resource is ranked as having a moderate ability to provide the specified ecological function.
H = High: Indicates that resource is ranked as having a high or optimal ability to provide the specified ecological function.

TABLE 3-4

Wetland Ecological Function Assessment

Bailey Mine Coal Refuse Disposal Areas No. 5 and 6

Richhill Township, Greene County, Pennsylvania

Consol Pennsylvania Coal Company LLC

CEC Project 071-522

	WETLAND CLASSIFICATION AND SIZE										Total
Cowardin Classification	PEM	PEM	PEM	PEM	PEM	PEM	PEM/SS	PEM	PEM/FO	PEM/FO	
Brinson Classification	Groundwater Slope	Groundwater Slope	Groundwater Slope	High-Gradient Riparian	High-Gradient Riparian	Low-Gradient Riparian	Low-Gradient Riparian	Low-Gradient Riparian	Low-Gradient Riparian	Low-Gradient Riparian	
Size Range	<0.1 Acre	0.1-0.5 Acre	>0.5 Acre	<0.1 Acre	0.1-0.5 Acre	<0.1 Acre	<0.1 Acre	0.1-0.5 Acre	0.1-0.5 Acre	>0.5 Acre	
Number of Wetlands in Permit Area	**12**	**4**	**1**	**28**	**2**	**25**	**1**	**5**	**1**	**1**	**80**
Total Acreage of Wetlands in Permit Area	**0.467**	**0.708**	**0.644**	**0.809**	**0.499**	**0.850**	**0.007**	**0.624**	**0.450**	**0.623**	**5.68**
AQUATIC FUNCTION											
HABITAT FUNCTIONS											
Food Chain Production	L	M	M	L	M	L	L	M	M	H	
Nesting	L	M	M	L	M	L	L	M	H	H	
Spawning	L	L	L	L	L	L	L	L	L	M	
Rearing	L	M	M	L	M	L	L	M	H	H	
Resting	L	M	M	L	M	L	L	M	H	H	
Migration	L	L	L	L	L	L	L	L	M	M	
Feeding	L	M	M	L	M	L	L	M	M	M	
Escape Cover	L	M	M	L	M	L	L	M	M	M	
Habitat for Threatened and Endangered Species	L	L	L	L	L	L	L	L	M	M	
HYDROLOGY FUNCTIONS											
Natural Drainage Patterns	L	L	L	L	M	L	L	M	M	H	
Current (Flow) Patterns	L	L	L	L	M	L	L	M	M	H	
Groundwater Discharge for Baseflows	L	M	H	L	M	L	L	M	M	M	
Natural Recharge Area for Ground and Surface Waters	L	L	L	L	M	L	L	M	M	H	
Flood and Stormwater Control	L	L	L	L	M	L	L	M	M	H	
WATER QUALITY FUNCTIONS											
Preventing Pollution	L	M	M	L	M	L	L	M	M	M	
Sedimentation Control and Patterns	L	M	M	L	M	L	L	M	H	H	
Natural Water Filtration	L	M	M	L	M	L	L	M	M	M	
RECREATION FUNCTIONS											
Game Species	L	L	L	L	L	L	L	L	L	L	
Non-Game Species	L	L	L	L	L	L	L	L	L	L	
Fishing	L	L	L	L	L	L	L	L	L	L	
Hiking	L	L	L	L	L	L	L	L	L	L	
Observation (Plant/Wildlife)	L	L	L	L	L	L	L	L	L	L	
ENVIRONMENTAL STUDY AREAS▲											
Sanctuaries	L	L	L	L	L	L	L	L	L	L	
Refuges	L	L	L	L	L	L	L	L	L	L	

L = Low: Indicates that resource is ranked as having a low ability to provide the specified ecological function.

M = Moderate: Indicates that resource is ranked as having a moderate ability to provide the specified ecological function.

H = High: Indicates that resource is ranked as having a high or optimal ability to provide the specified ecological function.

▲ - Function ranked as L (low), but wetlands do not function as sanctuaries or refuges.

TABLE 3-5

Normalization of Metric Scores and Calculation of Total Biological Scores for 32705-CRDA-BSW01 Sample 02/08/2008

Bailey Mine Coal Refuse Disposal Areas No. 5 and 6

Richhill Township, Greene County, Pennsylvania

Consol Pennsylvania Coal Company LLC

CEC Project 071-522

APPENDIX B METRIC TABLE				
Stream	**32705-CRDA-BSW01**			
Date	**Survey - 02/08/2008 200 ±20% org. subsample**			
Bioregion	**1**			
Biological Metric	**Observed Value**	**95th Percentile Value of Statewide Score**	**Normalized Score Obs/95th*100**	**Adjusted Value >100 = 100**
Taxa Richness	22	30.5	72.1	72.1
Trichoptera Richness	4	10.5	38.1	38.1
% EPT Richness	36	61.6	58.4	58.4
Intolerant Taxa Richness	9	16	56.3	56.3
FC + PR Taxa Richness	9	13.5	66.7	66.7
Total Biological Score (Mean of Adjusted Values)				**58.3**

2. Trichoptera Richness

Taxa = 4 Total

Cheumatopsyche	*Neophylax*
Pycnopsyche	*Chimarra*

3. % EPT Richness

EPT Taxa = 8

Neophylax	*Cheumatopsyche*	
Allocapnia	*Pycnopsyche*	
Prostoia	*Chimarra*	*Baetis*
Cultus	Value = (8/ 22) x 100 = 36%	

5. Filtering Collectors (FC) + Predator (PR) Richness

Taxa = 9 Total	FFG▲
Ceratopogonidae	PR
Prosimulium	FC
Simulium	FC
Dicranota	PR
Pseudolimnophila	PR
Cultus	PR
Cheumatopsyche	FC
Chimarra	FC
Sphaeriidae	FC

▲ = Functional Feeding Group

1. Taxa Richness Total = 22 taxa

Sample Taxa Included		
Oligochaeta	*Dicranota*	*Neophylax*
Dubiraphia	*Pseudolimnophila*	Sphaeriidae
Optioservus	*Baetis*	Lymnaeidae
Ceratopogonidae	*Allocapnia*	Physidae
Chironomidae	*Prostoia*	
Psychoda	*Cultus*	
Prosimulium	*Cheumatopsyche*	
Simulium	*Pycnopsyche*	
Chrysops	*Chimarra*	

Sample Taxa Excluded

4. Intolerant Taxa Richness (Value <5, i.e. ≤4)

Taxa = 9 Total	Tolerance Value
Optioservus	4
Dicranota	3
Pseudolimnophila	2
Allocapnia	3
Prostoia	2
Cultus	2
Pycnopsyche	4
Chimarra	4
Neophylax	3

TABLE 3-6

Normalization of Metric Scores and Calculation of Total Biological Scores for 32705-CRDA-BSW02 Sample 02/08/2008

Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

APPENDIX B METRIC TABLE				
Stream	32705-CRDA-BSW02			
Date	Survey - 02/08/2008 200 ±20% org. subsample			
Bioregion	I			
Biological Metric	**Observed Value**	**95th Percentile Value of Statewide Score**	**Normalized Score Obs/95th*100**	**Adjusted Value >100 = 100**
Taxa Richness	20	30.5	65.6	65.6
Trichoptera Richness	4	10.5	38.1	38.1
% EPT Richness	40	61.6	64.9	64.9
Intolerant Taxa Richness	9	16	56.3	56.3
FC + PR Taxa Richness	8	13.5	59.3	59.3
Total Biological Score (Mean of Adjusted Values)				**56.8**

2. Trichoptera Richness

Taxa = 4 Total

Cheumatopsyche *Rhyacophila*

Ironoquia *Neophylax*

3. % EPT Richness

EPT Taxa = 8

Allocapnia *Cheumatopsyche*

Amphinemura *Ironoquia*

Neophylax *Prostoia* *Isoperla*

Rhyacophila Value = (8/ 20) x 100 = 40%

5. Filtering Collectors (FC) + Predator (PR) Richness

Taxa = 8 Total	FFG▲
Ceratopogonidae	PR
Simulium	FC
Nigronia	PR
Sialis	PR
Isoperla	PR
Cheumatopsyche	FC
Rhyacophila	PR
Sphaeriidae	FC

▲ = Functional Feeding Group

1. Taxa Richness Total = 20 taxa

Sample Taxa Included		
Ceratopogonidae	*Allocapnia*	Lymnaeidae
Chironomidae	*Amphinemura*	Physidae
Prosimulium	*Prostoia*	
Simulium	*Isoperla*	
Caloparyphus	*Cheumatopsy*	
Chrysops	*Ironoquia*	
Tipula	*Rhyacophila*	
Nigronia	*Neophylax*	
Sialis	Sphaeriidae	

Sample Taxa Excluded

4. Intolerant Taxa Richness (Value <5, i.e. ≤4)

Taxa = 9 Total	Tolerance Value
Tipula	4
Nigronia	1
Allocapnia	3
Amphinemura	3
Prostoia	2
Isoperla	2
Ironoquia	3
Rhyacophila	1
Neophylax	3

TABLE 3-7

Normalization of Metric Scores and Calculation of Total Biological Scores for UNT-OR-CRDA-BSW03 Sample 02/08/2008

Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

APPENDIX B METRIC TABLE				
Stream	**UNT-OR-CRDA-BSW03**			
Date	**Survey - 02/08/2008 200 ±20% org. subsample**			
Bioregion	**1**			
Biological Metric	**Observed Value**	**95th Percentile Value of Statewide Score**	**Normalized Score Obs/95th*100**	**Adjusted Value >100 = 100**
Taxa Richness	30	30.5	98.4	98.4
Trichoptera Richness	5	10.5	47.6	47.6
% EPT Richness	57	61.6	92.5	92.5
Intolerant Taxa Richness	19	16	118.8	100.0
FC + PR Taxa Richness	13	13.5	96.3	96.3
Total Biological Score (Mean of Adjusted Values)				**87.0**

1. Taxa Richness Total = 30 taxa

Sample Taxa Included			
Oligochaeta	*Tipula*	*Leuctra*	*Neophylax*
Rhyacophila	*Ameletus*	*Amphinemu*	Sphaeriidae
Ceratopogonidae	*Ephemerella*	*Acroneuria*	Lymnaeidae
Chironomidae	*Eurylophella*	*Clioperla*	
Prosimulium	*Epeorus*	*Cultus*	
Simulium	*Stenacron*	*Diplectrona*	
Chrysops	*Sialis*	*Pycnopsych*	
Hexatoma	*Allocapnia*	*Molanna*	
Pseudolimnophila	*Sweltsa*	*Ectopria*	

Sample Taxa Excluded
Sciomyzidae

2. Trichoptera Richness

Taxa = 5 Total

Diplectrona	*Molanna*	*Rhyacophila*
Pycnopsyche	*Neophylax*	

3. % EPT Richness

EPT Taxa = 17	*Neophylax*	*Clioperla*
Rhyacophila	*Diplectrona*	*Cultus*
Ameletus	*Stenacron*	*Leuctra*
Ephemerella	*Allocapnia*	*Amphinemura*
Eurylophella	*Sweltsa*	*Acroneuria*
Pycnopsyche	*Epeorus*	*Molanna*

Value = (17/30) x 100 = 57%

4. Intolerant Taxa Richness (Value <5, i.e. ≤4)

Taxa = 19 total	TV▲	Taxa	TV▲
Hexatoma	2	*Sweltsa*	0
Pseudolimnophila	2	*Leuctra*	0
Tipula	4	*Amphinemura*	3
Ameletus	0	*Acroneuria*	0
Ephemerella	1	*Clioperla*	2
Eurylophella	4	*Cultus*	2
Epeorus	0	*Diplectrona*	0
Stenacron	4	*Pycnopsyche*	4
Allocapnia	3	*Neophylax*	3
Rhyacophila	1		

▲ = Tolerance Value

5. Filtering Collectors (FC) + Predator (PR) Richness

Taxa = 13 Total	FFG▲
Ceratopogonidae	PR
Prosimulium	FC
Simulium	FC
Rhyacophila	PR
Hexatoma	PR
Pseudolimnophila	PR
Sialis	PR
Sweltsa	PR
Acroneuria	PR
Clioperla	PR
Sphaeriidae	FC
Cultus	PR
Diplectrona	FC

▲ = Functional Feeding Group

TABLE 3-8

Water Quality/Stream Habitat Characteristics at Sampling Stations BSW01, BSW02, BSW03

Bailey Mine Coal Refuse Disposal Areas No. 5 and 6

Richhill Township, Greene County, Pennsylvania

Consol Pennsylvania Coal Company LLC

CEC Project 071-522

Parameter	BSW01	BSW02	BSW03
	February 8, 2008	February 8, 2008	February 8, 2008
Water Quality			
Water Temperature (°C)	4.8	5.1	5.3
Flow (cfs)	2.71	1.39	0.34
Flow (gpm)	1,216	625	153
Conductivity (µS/cm)	232	287	101
Field pH	7.47	7.37	7.01
Dissolved Oxygen (mg/L)	10.91	11.51	10.94
Wolman Pebble Count Data			
Silt	3%	7%	1%
Sand	17%	14%	6%
Gravel	46%	68%	67%
Cobble	15%	9%	23%
Boulder	3%	2%	3%
Bedrock	16%	0%	0%
Total %	100%	100%	100%
USEPA High-Gradient Stream Habitat Assessment			
Epifaunal Substrate/Available Cover	12	12	15
Embeddedness	13	12	16
Velocity/Depth Regimes	17	11	7
Sediment Deposition	12	10	14
Channel Flow Status	19	13	17
Channel Alteration	20	20	20
Frequency of Riffles (or bends)	11	18	15
Bank Stability	9	8	10
Vegetative Protection	15	18	14
Riparian Vegetative Zone Width	17	18	16
Total Score	**145**	**140**	**144**
Habitat Score Narrative Category	**Suboptimal**	**Suboptimal**	**Suboptimal**

Table 4-1
Stream Restoration Area Summary Table
Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project 071-522

Restoration Area	Stream	Stream Classification	Total Length (l.f.)
1	Templeton Fork	Perennial	3,076
	Tributary 32738 to Templeton Fork	Perennial	4,172
	UNT-1 to Templeton Fork	Intermittent	606
		Subtotal	**7,854**
2	Templeton Fork	Perennial	1,208
	Tributary 32731 to Templeton Fork	Perennial	1,604
	Tributary 32732 to Templeton Fork	Intermittent	2,968
		Subtotal	**5,780**
3	Rocky Run	Perennial	6,703
	Tributary 32723 to Rocky Run	Perennial	706
	Tributary 32724 to Rocky Run	Perennial	1,270
	UNT-1 to Rocky Run	Intermittent	454
	UNT-2 to Rocky Run	Intermittent	345
	UNT-3 to Rocky Run	Intermittent	170
		Subtotal	**9,648**
4	Rocky Run	Perennial	**3,071**
		Total Intermittent Length	**4,543**
		Total Perennial Length	**21,810**
		Total Length	**26,353**

Table 4-2
Stream Restoration Summary
Templeton Fork Stream Restoration - Area 1
Bailey CRDA No. 5 and 6

		Deficiencies						Restoration Measures							Adjacent Landuse				Habitat				Substrate						Hydrology/Morphology					
Reach	Bank	Scoured Banks	Unstable Channel	Lack of Riparian Vegetation	Central Gravel Bars	Uniform Flow and Depth Regime	Unstable Meanders	Grade Banks/Coir Logs/Coir Mats	Plant Woody Vegetation	Install Rock Vanes	Place Boulder Habitat	Install Boulder Toe Protection	Regrade/Relocate Channel	Steep Bank Stabilization	Forest/Shrub	Pasture/Meadow	Lawn	Wetland	Riffle	Run	Pool	Glide	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Wetted Width (Feet)	Active Width (Feet)	Avg. Bank Height (Feet)	Water Depth (Inches)	Length (feet)	Comments & Photograph Numbers
Templeton Fork																																		
1	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X	X	X	X			X	X	X	X	3-6	6-8	3-4	1-24	334	Photo (1)
2	RDB	X		X				X	X	3	X					X																		Two tight meanders present; install rock vanes. Photos
	LDB	X		X				X	X	3	X					X					X	X				X	X		8-10	8-10	3-4	12-24	322	(2-3)
3	RDB	X		X				X								X																		
	LDB	X		X				X								X			X	X					X	X			3-4	5-7	4-5	2-4	137	Photo (4)
4	RDB			X					X							X																		
	LDB			X					X							X			X	X					X	X			2-4	3-5	5-6	2-4	663	End at Rt. 231.Photos (5-6)
5	RDB	X		X			X	X	X	12						X																		
	LDB	X		X			X	X	X	6						X			X	X					X	X	X		2-4	5-8	4-6	2-8	836	Start upstream of township property. Photos (7-11)
6	RDB	X		X				X	X							X																		
	LDB			X					X							X			X	X					X	X			3-5	5-6	2	2-6	125	LDB stable, plant woody vegetation. Photo (12)
7	RDB	X		X	X			X	X							X															6			
	LDB			X	X				X							X			X	X					X	X			7-2	2	1	2-4	55	Remove central gravel bar. Photo (13)
8	RDB	X		X				X	X							X															2-3			
	LDB	X												X	X						X					X	X	X	7-9	12	1-2	18	101	Photo (14)
9	RDB	X		X				X	X	5						X															1			
	LDB			X					X							X			X		X					X	X		3-8	10-12	8	2-12	154	Extremely Eroded. Photo (15)
10	RDB			X					X							X															2			
	LDB	X		X				X	X							X						X			X	X		X	6-8	8	1	4-10	107	Minor bank grading LDB. Photo (16)
11	RDB	X		X				X	X	3						X															2-5			
	LDB	X		X				X	X							X			X			X			X	X	X	X	5-8	6-9	3	3-12	242	Photos (17-18)
																																Total Length	3,076	
UNT-1 to Templeton Fork																																		
1	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X								X	X	N/A	2-3	4	N/A	283	Channel Dry (road crossing b/w 1&2). Photos (19-20)
2	RDB	X		X				X	X							X																		
	LDB														X	X			X							X	X		N/A	2-3	2	N/A	323	End where road starts to incline. Photos (21-22)
																																Total Length	606	
Tributary 32738 to Templeton Fork																																		
1	RDB	X		X			X	X	X				X			X																		
	LDB	X		X			X	X	X				X			X			X	X		X			X	X	X		2-3	3-5	2	2-5	298	Reroute channel. Photo (23)
2	RDB	X		X				X	X							X																		
	LDB								X						X				X	X		X			X	X	X		3-4	4-5	2	2-4	278	Photo (24)
3	RDB														X																			
	LDB														X				X	X									3-4	4-5	1	2-4	94	No Treatment. Photo (25)
4	RDB	X		X				X	X							X																		
	LDB														X							X			X	X			3-4	4-5	2	2-4	82	Photo (26)
5	RDB														X																			
	LDB														X				X	X					X	X			3-5	4-6	1	2-4	246	No Treatment. Photo (27)
6	RDB			X					X							X																		
	LDB			X					X							X			X	X					X	X			2-3	4-5	<1	2-3	284	Photo (28)
7	RDB														X																			
	LDB			X					X							X			X	X						X	X		4-5	4-6	1	2-6	132	Photo (29)
8	RDB														X																2			Appears to be old farm pond that was breached.
	LDB	X		X				X	X							X			X	X					X	X			3-4	4-6	<1	1-3	97	(Photo 30)
9	RDB														X																			
	LDB			X					X							X			X	X					X	X			4-6	4-8	1	2-6	97	Photo (31)
10	RDB	X		X			X	X	X				X			X																		
	LDB	X		X			X	X	X				X			X			X	X		X			X	X			2-4	2-4	3-5	2-5	263	Reroute stream to cut adverse meander. Photo (32)
11	RDB	X		X				X	X	3						X																		Start upstream of the bridge. LDB relatively stable.
	LDB														X				X	X					X	X			2-3	3-5	3-4	2-5	255	Photo (33)
12	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X	X					X	X			1-4	4-6	2-3	2-4	104	Photo (34)
13	RDB	X		X					X						X																			Minor areas of scoured bank, RDB needs repaired.
	LDB	X		X				X	X	5						X			X	X					X	X			2-5	2-4	2-3	1-5	852	Photos (35-36)
14	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X	X					X	X	X		2-5	2-5	2-3	1-4	604	Photo (37)
15	RDB														X																			
	LDB	X		X				X	X							X			X	X					X	X	X		2-4	3-5	3	2-4	461	Photo (38)
16	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X	X		X			X	X	X		2-3	3-4	3-4	1-3	365	End reach 16 at prop line Photos (39-40)
																																Total Length	4,172	

Table 4-3
Stream Restoration Summary
Templeton Fork Stream Restoration - Area 2
Bailey CRDA No. 5 and 6

		Deficiencies						Restoration Measures							Adjacent Landuse				Habitat				Substrate						Hydrology/Morphology					
Reach	Bank	Scoured Banks	Unstable Channel	Lack of Riparian Vegetation	Central Gravel Bars	Uniform Flow and Depth Regime	Unstable Meanders	Grade Banks/Coir Logs/Coir Mats	Plant Woody Vegetation	Rock Vanes	Boulder Habitat	Install Boulder Toe Protection	Regrade/Relocate Channel	Steep Bank Stabilization	Forest/Shrub	Pasture/Meadow	Lawn	Wetland	Riffle	Run	Pool	Glide	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Wetted Width	Active Width	Avg. Bank Height	Water Depth	Length (Feet)	Comments & Photograph Numbers
Templeton Fork																																		
1	RDB			X					X							X																		
	LDB	X*						CL	X						X				X	X					X	X	X		6-8	12-15	5	2-5	145	Photo (1) *minor scour on LDB- use coir logs w/ live stakes
2	RDB			X		X			X		X					X		X																
	LDB			X		X			X		X					X					X	X				X	X		15-20	15-20	2	24	186	Photo (2) *Powerline ROW
3	RDB	UFDR		X					X		X					X		X																
	LDB										X				X						X	X				X	X		15-20	15-20	2	24	269	Photo (3)
4	RDB	X		X				X	X	4						X																		
	LDB																	X				X				X	X		10-12	10-12	3	18	162	Photo (4)
5	RDB	X		X				X	X							X															2			
	LDB	X		X				X	X							X		X			X	X				X	X		15-20	15-20	3	12-18	89	Photo (5)
6	RDB			X					X							X															1			
	LDB	X		X				CL	X							X			X	X					X	X			5-7	10	3	2-5	120	Photo (6)
7	RDB	X		X	X			X	X							X																		
	LDB				X										X				X										4-5	25	2	2-5	71	Photo (7)
8	RDB			X					X							X																		
	LDB														X						X	X				X	X		8-12	15	<1	6-12	166	Photos (8) Plant RDB; LDB stable
																															Total Length		1,208	
Tributary 32731 to Templeton Fork																																		
1	RDB			X			X		X				X			X		X																
	LDB			X			X		X				X			X		X	X	X						X	X	X	2-3	3-4	1	2-5	331	Photo (9) rework meander @ downstream end
2	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X	X					X	X	X	X	2-3	3-4	1-3	2-5	116	Photo (10)
3	RDB	X		X				X	X							X																		
	LDB	X		X					X					X		X			X	X					X	X	X	X	2-3	2-3	6-8	2-5	42	Photo (11)
4	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X	X					X	X	X	X	2-3	2-3	2-3	2-5	334	Photo (12)
5	RDB	X		X				X	X					X		X															3-8			
	LDB	X		X				X	X							X			X	X					X	X	X	X	1-3	1-2	2-3	2-5	127	Photo (13)
6	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X	X					X	X	X		1-3	1-2	2-3	2-4	160	Photo (14)
7	RDB	X		X					X					X		X																		
	LDB	X		X				X	X							X			X	X					X	X	X		1-3	1-2	2-3	2-4	81	Photo (15)
8	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X	X					X	X	X		1-3	1-3	1-4	2-5	91	Photo (16)
9	RDB	X		X					X					X		X															4-8			
	LDB	X		X				X	X							X			X	X					X	X	X		2-4	2-3	1-3	2-5	46	Photo (17)
10	RDB	X		X												X																		
	LDB	X							X							X			X	X					X	X	X		2-3	1-2	2-4	2-5	127	Photo (18) reaches 10 to 11 break
11	RDB			X					X							X		X																
	LDB			X					X							X			X	X					X	X	X	X	2-4	2-3	2-3	2-3	149	Photo (19)
																															Total Length		1,604	
Tributary 32732 to Templeton Fork																																		
1	RDB			X				X*	X				X			X																		
	LDB			X				X*	X				X			X												X	N/A	2-3	2-3	N/A	412	Photos (20)* No well defined channel (end @ rd.); excavate new channel
2	RDB	X		X				X	X				X			X																		
	LDB	X		X				X	X				X			X												X	N/A	4-5	2-3	N/A	584	Photos (21) Excavate new channel
3	RDB												X		X																steep			
	LDB	X		X					X				X			X												X	N/A	3-5	2	N/A	152	Photo (22) Excavate new channel
4	RDB	X*		X					X							X																		
	LDB	X*		X					X							X										X	X		N/A	3-4	2	N/A	183	Photos (23)
5	RDB														X																			
	LDB	X		X				X	X							X										X	X		1-2	5-6	3-4	4	383	Photo (24)
6	RDB														X																			
	LDB														X				X										1-2	3-4	2-3	<1	247	Photo (25) No treatment
7	RDB			X				X*	X				X			X																		
	LDB			X				X*	X				X			X												X	N/A	N/A	N/A	N/A	450	Photo (26) *No defined channel - excavate new channel.
8	RDB	X		X				X	X							X																		
	LDB	X		X				X	X							X			X						X	X	X		1-2	2-4	1-3	<1	804	Photo (27) end at ROW
																															Total Length		2,968	

Table 4-4
Stream Restoration Summary
Rocky Run Stream Restoration - Area 3
Bailey CRDA No. 5 and 6

		Deficiencies						Restoration Measures							Adjacent Landuse				Habitat				Substrate						Hydrology/Morphology					
Reach	Bank	Scoured Banks	Unstable Channel	Lack of Riparian Vegetation	Central Gravel Bars	Uniform Flow and Depth Regime	Unstable Meanders	Grade Banks/Coir Logs/Coir Mats	Plant Woody Vegetation	Rock Vanes	Boulder Habitat	Install Boulder Toe Protection	Regrade/Relocate Channel	Steep Bank Stabilization	Forest/Shrub	Pasture/Meadow	Lawn	Wetland	Riffle	Run	Pool	Glide	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Wetted Width	Active Width	Avg. Bank Height	Water Depth	Length (Feet)	Comments & Photograph Numbers
Rocky Run																																		
1	RDB	X		X				X	X							X															5			
	LDB														X				X							X	X	X	3-5	5-6	1-2	4-7	117	Photo (1)
2	RDB	X			X			X	X							X															2-4			
	LDB	X			X			X	X						X				X		X					X	X	X	3-14	14-17	2-4	12-30	94	Photo (2) Central gravel bar located below pool.
3	RDB	X		X				X	X							X															3-5			
	LDB														X				X							X	X	X	1-4	5-6	3-5	3-6	129	Photo (3)
4	RDB	X					X		X				X			X															2-6			
	LDB	X					X		X				X		X				X		X					X	X	X	1-5	6-7	2-4	3-24	171	Photos (4) Relocate channel
5	RDB			X					X							X															1-3			
	LDB	X							X					X	X				X						X	X	X	X	1-4	4-5	3-7	1-7	134	Photo (5)
6	RDB	X		X	X			X	X							X															2-4			
	LDB														X				X		X				X	X	X	X	3-7	7-9	2-4	1-18	67	Photo (6)
7	RDB															X															2-4			
	LDB															X			X						X	X	X	X	1-3	4-5	3-8	2-6	52	Photo (7) No treatment
8	RDB			X					X							X															1-2			
	LDB															X			X		X				X	X	X	X	1-5	5-6	1-2	2-12	58	Photo (8)
9	RDB															X															2-3			
	LDB	X						X*	X							X			X			X			X	X	X	X	2-6	6-7	3-5	4-20	67	Photo (9) *Install coir logs with live stakes
10	RDB	X		X				X	X							X															3-4			
	LDB			X					X							X					X	X				X	X	X	2-5	5-6	2-3	5-11	109	Photo (10)
11	RDB	X		X				X	X							X															2-4			
	LDB	X		X				X	X							X			X		X	X			X	X	X	X	1-6	6-8	2-4	3-24	459	Photo (11)
12	RDB														X																3-4			
	LDB	X						X	X*							X			X		X	X			X	X	X	X	2-6	6-8	3-4	3-24	255	Photo (12) *Preserve mature trees
13	RDB														X																3-5			
	LDB														X				X		X				X	X	X	X	3-10	10-13	2-3	3-18	94	Photo (13) No treatment
14	RDB	X		X				X	X							X															2-5			
	LDB	X		X				X	X						X				X		X	X			X	X	X	X	1-4	4-5	2-6	3-12	273	Photo (14)
15	RDB														X																1-2			
	LDB			X					X									X	X		X					X	X	X	4-8	8-11	1	3-12	132	Photo (15)
16	RDB			X					X						X																1-2			
	LDB	X		X				X	X									X			X	X				X	X		3-5	5-6	1-2	6-24	266	Photo (16)
17	RDB														X																1-3			
	LDB	X		X				X	X							X			X		X	X			X	X	X	X	2-4	4-5	1-4	3-8	372	Photo (17)
18	RDB	X		X				X	X						X																3-7			
	LDB	X		X				X	X							X			X						X	X	X	X	1-4	4-5	3-6	2-20	413	Photo (18)
19	RDB	X		X	X		X		X				X		X																1-4			
	LDB	X		X	X		X		X				X			X			X		X	X				X	X	X	2-4	4-5	2-5	2-18	368	Photo (19) Relocate channel
20	RDB	X						X	X						X																3-7			
	LDB	X						X	X						X	X			X		X	X				X	X	X	2-5	5-6	3-8	2-18	393	Photo (20)
21	RDB														X																1-3			
	LDB			X					X							X			X							X	X	X	2-3	3-4	1	2-6	96	Photo (21)
22	RDB	X					X		X				X		X																1-4			
	LDB	X					X		X				X			X			X		X	X				X	X	X	1-6	6-7	1-4	2-18	144	Photo (22) Relocate channel
23	RDB	X			X			X	X						X																1-3			
	LDB	X			X			X	X							X			X		X	X				X	X	X	1-4	5-6	1-3	2-20	456	Photo (23)
24	RDB		X					X	X							X															1-2			
	LDB															X			X							X	X	X	1-3	3-4	1	1-6	286	Photo (24) Salvage willows

Table 4-4
Stream Restoration Summary
Rocky Run Stream Restoration - Area 3
Bailey CRDA No. 5 and 6

		Deficiencies						Restoration Measures							Adjacent Landuse				Habitat				Substrate						Hydrology/Morphology					
Reach	Bank	Scoured Banks	Unstable Channel	Lack of Riparian Vegetation	Central Gravel Bars	Uniform Flow and Depth Regime	Unstable Meanders	Grade Banks/Coir Logs/Coir Mats	Plant Woody Vegetation	Rock Vanes	Boulder Habitat	Install Boulder Toe Protection	Regrade/Relocate Channel	Steep Bank Stabilization	Forest/Shrub	Pasture/Meadow	Lawn	Wetland	Riffle	Run	Pool	Glide	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Wetted Width	Active Width	Avg. Bank Height	Water Depth	Length (Feet)	Comments & Photograph Numbers
25	RDB															X															1-2			
	LDB															X			X		X	X			X	X	X	X	2-3	3-4	1-2	1-10	119	Photo (25) No treatment
26	RDB		X					X	X							X															1-2			
	LDB															X			X						X	X	X	X	4-5	4-5	1-2	1-5	163	Photo (26)
27	RDB	X		X			X	X	X							X		X													1-4			
	LDB	X		X			X	X	X							X		X	X		X	X				X	X	X	10-11	10-11	1-4	4-24	1,681	Photo (27) End at road
																															Total Length		6,703	
Tributary 32723 to Rocky Run																																		
1	RDB		X					X	X							Road															1-2			
	LDB															X			X							X	X	X	1	1-2	1-2	1-4	706	Photo (28) Road on LDB.
																															Total Length		706	
Tributary 32724 to Rocky Run																																		
1	RDB			X			X*		X				X			X															<1			Photo (29) *Poorly defined channel - excavate new
	LDB			X			X*		X				X			X			X								X	X	N/A	1-2	<1	N/A	191	channel
2	RDB														X																<1			Photo (30) Driveway goes over creek.
	LDB																X		X							X	X	X	N/A	4-5	1	N/A	129	Barn/garage LDB. No treatment
3	RDB	X		X				X	X							X															2			
	LDB	X		X				X	X							X			X			X					X	X	N/A	2-5	2	N/A	166	Photo (31)
4	RDB	X		X				X	X							X															1			
	LDB														X				X							X	X	X	N/A	2-4	1	N/A	784	Photo (32)
																															Total Length		1,270	
UNT-1 to Rocky Run																																		
1	RDB	X						X	X							X															1-2			Photo (33) Grade channel to stable cross section.
	LDB	X						X	X							X			X						X	X	X	X	DRY	-	1-2	DRY	454	Remove access road culvert
																															Total Length		454	
UNT-2 to Rocky Run																																		
1	RDB		X	X				X	X							X			No Channel										DRY		No channel	DRY	345	Photo (34) Grade channel to stable cross section
	LDB		X	X				X	X							X																		
																															Total Length		345	
UNT-3 to Rocky Run																																		
1	RDB		X	X				X	X							X															<1			
	LDB		X	X				X	X							X			X							X	X		1	2-3	<1	1	170	Photos (35) End of reach at road
																															Total Length		170	

Table 4-5
Stream Restoration Summary
Rocky Run Stream Restoration - Area 4
Bailey CRDA No. 5 and 6

		Deficiencies					Restoration Measures						Adjacent Landuse				Habitat				Substrate						Hydrology/Morphology					
Reach	Bank	Scoured Banks	Unstable Channel	Lack of Riparian Vegetation	Central Gravel Bars	Unstable Meanders	Grade Banks/Coir Logs/Coir Mats	Plant Woody Vegetation	Rock Vanes	Boulder Habitat	Install Boulder Toe Protection	Steep Bank Stabilization	Forest/Shrub	Pasture/Meadow	Lawn	Wetland	Riffle	Run	Pool	Glide	Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Wetted Width	Active Width	Avg. Bank Height	Water Depth	Length (Feet)	Comments & Photograph Numbers
Rocky Run																																
1	RDB	X		X			X	X						X															4-5			
	LDB											X	X					X				X	X	X			10-12	12-15	2-3	2-8	205	Photo (1) The channel is incised by 4 to 5 feet.
2	RDB	X					X	X	X				X																2-3			
	LDB	X					X	X						X			X	X					X	X			10-12	12-15	1-2	2-10	139	Photo (2)
3	RDB	X				X					X		X																2-3			Photo (3) Large pool located at upstream end of
	LDB			X		X	X	X						X			X	X	X				X	X		X	10-12	12-15	2-3	2-30	112	reach
4	RDB	X		X			X	X						X															2-3			
	LDB	X		X			X	X	X				X						X	X					X	X	8-10	10-12	4-5	6-12	515	Photo (4) The channel is incised by 4 to 5 feet.
5	RDB			X	X	X		X					X																0-2			
	LDB	X			X	X					X			X						X						X	10-12	12-15	2-3	6-10	64	Photo (5)
6	RDB	X	X	X			X	X	X					X															5-7			
	LDB	X		X			X	X					X				X	X		X			X	X		X	10-12	12-15	2-3	6-20	208	Photo (6)
7	RDB			X	X		X	X					X																2-4			Photo (7) Vegetated gravel bar is present in the
	LDB			X	X			X						X			X	X					X	X			8-10	12-15	2-3	2-10	69	center of the channel
8	RDB				X	X	X	X						X															2-3			
	LDB			X	X	X					X		X						X	X				X		X	5-10	10-12	2-3	2-7	60	Photo (8) Tight meanders present within this reach
9	RDB	X		X			X	X		X				X															4-6			Photo (9) Large (30 dbh) oak on RDB, long (60') willow
	LDB	X		X			X	X						X			X	X					X	X			10-12	12-15	4-6	2-7	339	thicket present on LDB
10	RDB	X		X			X	X					X																2-3			
	LDB	X						X				X		X						X			X			X	8-10	10-12	4-5	5-10	53	Photo (10)
11	RDB	X		X			X	X	X					X															5-6			
	LDB	X		X			X	X	X					X			X	X					X	X			8-10	10-12	5-6	2-7	225	Photo (11)
12	RDB	X		X			X	X						X															5-6			
	LDB	X										X	X				X	X		X			X	X		X	8-10	10-12	2-3	2-7	173	Photo (12)
13	RDB	X		X			X	X	X	X				X															1-2			Photo (13) substrate dominated by silt (>16" deep)
	LDB	X		X			X	X	X					X						X						X	10-12	12-15	1-2	2-7	367	due to relic beaver dams
14	RDB	X							X				X													Clay/			3-5			
	LDB			X				X						X						X						Silt	8-10	10-12	2-3	5-12	52	Photo (14)
15	RDB	X		X			X	X						X												Clay/			2-3			
	LDB	X		X			X	X	X					X						X						Silt	8-10	10-12	2-3	5-12	150	Photo (15)
16	RDB	X					X	X								X													3-4			
	LDB	X						X				X	X				X	X					X	X			8-10	10-12	2-3	5-12	178	Photo (16)
17	RDB			X				X								X													2-3			
	LDB	X		X			X	X						X			X	X					X	X	X		8-10	10-12	2-3	5-10	162	Photo (17)
																													Total Length		3,071	

FIGURES

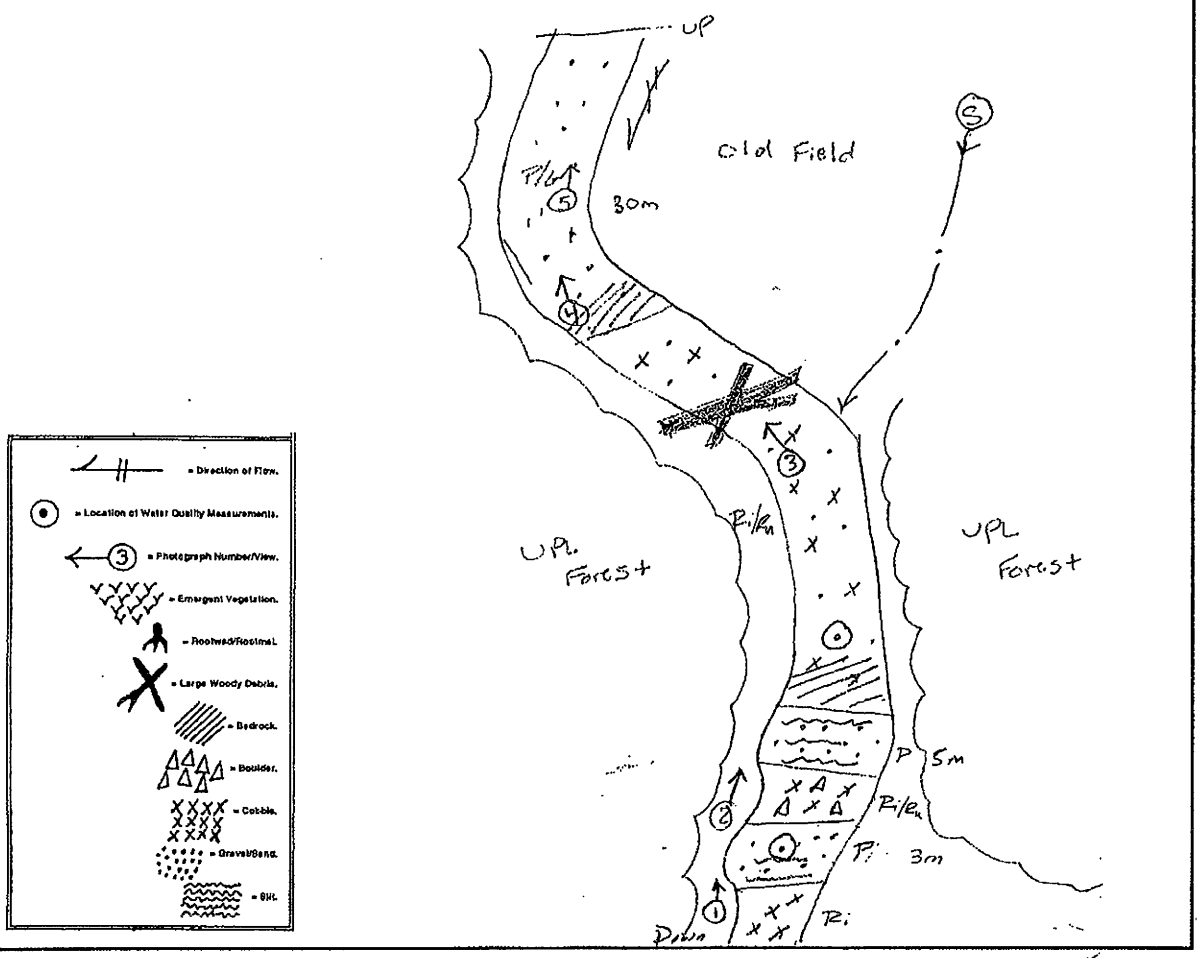
APPENDIX A

STREAM BIOMONITORING DATA FORMS AND PHOTOGRAPHS

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 1)

Station: 32705-CRDA-BSW01		Project No.: 071-522.0002	
Stream Name: 32705		Date/Time: 2-8-08	8:45 am
River Basin: Ohio		Investigators: MLS, JAD, JWC	

SKETCH MAP



WEATHER CONDITIONS	Air Temperature: 30° F			
	Weather	Now	Past 24 hrs	Past 7 days
	Heavy Rain			2"
	Steady Rain			
	Intermit. Rain		Light snow	
	% Cloud Cover	100%		
	Clear/Sunny			
	Other:			

HABITAT LENGTHS IN SAMPLING REACH		
Habitat	Length (~~steps~~ meters)	Length (ft)
Riffle	62m	
Run		
Pool	38m	
Glide		
Total		

STREAM CHARACTER-IZATION							
	Subsystem:	Perennial ✓	Intermittent ____	Tidal ____			
	Type:	Coldwater ____	Warmwater ✓				
	Origin:	Spring-fed ✓	Wetland ✓	Montane ____	Glacial ____	Mixture ____	Other ____

GPS UNIT USED: GeoXT 3	CAMERA USED: E	PHOTO NO.S: 1-5

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 2)

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 8:45am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

WATERSHED FEATURES

Predominant Surrounding Landuse
- ☑ Forest
- ☑ Field/Pasture
- ☐ Agricultural
- ☐ Residential
- ☐ Commercial
- ☐ Industrial
- ☐ Other _____

Local Watershed NPS Pollution
- ☑ No evidence
- ☐ Some potential sources
- ☐ Obvious sources

Local Watershed Erosion
- ☐ None
- ☑ Moderate
- ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
- ☑ Trees
- ☐ Shrubs
- ☑ Grasses
- ☑ Herbaceous

dominant species present Juglans nigra, Poa sp., Verbesina alternifolia

INSTREAM FEATURES

Estimated Reach Length 100 m

Estimated Stream Width 5-15

Sampling Reach Area _____

Area in km² (m²x1000) _____

Estimated Stream Depth 4-24"

Surface Velocity (at thalweg) _____

Canopy Cover
- ☐ Open
- ☐ Partly open
- ☑ Partly shaded
- ☐ Shaded

High Water Mark 18"

Proportion of Reach Represented by Stream Morphology Types
- ☐ Riffle ____ %
- ☐ Run ____ % 62%
- ☐ Pool ____ %
- ☐ Glide ____ % 38%

Channelized ☐ Yes ☑ No

Dam Present ☐ Yes ☑ No

STREAM DEPTH:

Riffle/Run = 4-8"

Pool/Glide = 8-24"

LARGE WOODY DEBRIS

LWD ✓ 2%

Density of LWD _____

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
- ☑ Rooted emergent
- ☐ Rooted submergent
- ☐ Rooted floating
- ☐ Free floating
- ☐ Floating Algae
- ☐ Attached Algae

dominant species present Carex stricta

Portion of the reach with aquatic vegetation 5%

WATER QUALITY

POOL:
- Temperature = 4.8°C
- Conductivity = 231 us
- Dissolved Oxygen = 10.86 mg/L
- pH = 7.48

RIFFLE:
- Temperature = 4.8°C
- Conductivity = 232 us
- Dissolved Oxygen = 10.91 mg/L
- pH = 7.47

Water Odors
- ☑ Normal/None
- ☐ Petroleum
- ☐ Fishy
- ☐ Sewage
- ☐ Chemical
- ☐ Other _____

Water Surface Oils
- ☐ Slick
- ☐ Sheen
- ☐ Globs
- ☐ Flecks
- ☑ None
- ☐ Other _____

Turbidity (if not measured)
- ☐ Clear
- ☐ Slightly turbid
- ☐ Turbid
- ☑ Opaque
- ☐ Stained
- ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
- ☑ Normal
- ☐ Sewage
- ☐ Petroleum
- ☐ Chemical
- ☐ Anaerobic
- ☐ None
- ☐ Other _____

Oils
- ☑ Absent
- ☐ Slight
- ☐ Moderate
- ☐ Profuse

Deposits
- ☐ Sludge
- ☐ Sawdust
- ☐ Paper fiber
- ☑ Sand
- ☐ Relict shells
- ☐ Other _____

Looking at stones which are not deeply embedded, are the undersides black in color?
- ☐ Yes
- ☑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach: Riffle	% Composition in Sampling Reach: Pool
Bedrock		10	0
Boulder	> 256 mm (10")	15	
Cobble	64-256 mm (2.5"-10")	25	
Gravel	2-64 mm (0.1"-2.5")	40	70
Sand	0.06-2mm (gritty)	10	20
Silt	0.004-0.06 mm		10
Clay	< 0.004 mm (slick)		

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

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	2%
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

STREAM DISCHARGE FIELD DATA FORM

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 8:45am
River Basin:	Ohio	Investigators:	HLS, JAD, JWC
Method: Midsection, current meter method		Flow Meter (Model and No.):	Marsh McBirney Flowmate
Stream Wetted Width:	7.5 feet	Starting Point:	(RDB) LDB

Distance (ft)[1]	Width (ft)[2]	Depth (ft)[3]	Observation Depth[4]	Velocity (ft/s)	Notes/Comments
0.25	0.5	0.30	0.6	0.00	
0.75	0.5	0.40	0.6	0.04	
1.25	0.5	0.50	0.6	0.45	
1.75	0.5	0.60	0.6	0.70	
2.25	0.5	0.60	0.6	0.95	
2.75	0.5	0.60	0.6	1.11	
3.25	0.5	0.70	0.6	1.03	
3.75	0.5	0.75	0.6	0.86	
4.25	0.5	0.75	0.6	0.78	
4.75	0.5	0.80	0.6	0.65	
5.25	0.5	0.70	0.6	0.69	
5.75	0.5	0.60	0.6	0.56	
6.25	0.5	0.50	0.6	0.37	
6.75	0.5	0.30	0.6	0.15	
7.25	0.5	0.05	0.6	0.00	
					Discharge 2.71 cfs, 1216 gpm

[1] Distance from starting point on stream bank to velocity and depth measurement midpoint or "observation vertical"

[2] Width of measurement section; see Figure 1, sketch of midsection method, for width computation equations

[3] Depth at velocity measurement midpoint or "observation vertical"

[4] Observation depth of velocity measurement - either 0.6 depth (one point method) or 0.2 and 0.8 depth (two point method)

PEBBLE COUNT FIELD DATA SHEET

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 10:00am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Particle	Description	Size (mm)	Particle Count: Riffle/Run	Particle Count: Pool/Glide	TOTAL
FINES	Silt/Clay	< 0.062	I	II	3
SAND	Very Fine	0.062 – 0.125		II	2
	Fine	0.125 – 0.25	I	III	4
	Medium	0.25 – 0.5		~~IIII~~	5
	Coarse	0.5 – 1.0	I	I	2
	Very Coarse	1.0 – 2.0	I	III	4
GRAVEL	Very Fine	2.0 – 4.0	I	II	3
	Fine	4.0 – 5.7	I	II	3
	Fine	5.7 – 8.0	II	II	4
	Medium	8.0 – 11.3	~~IIII~~	III	8
	Medium	11.3 – 16.0	IIII	I	5
	Coarse	16.0 – 22.6	~~IIII~~	I	6
	Coarse	22.6 – 32	~~IIII~~ III	II	10
	Very Coarse	32 – 45	I	I	2
	Very Coarse	45 – 64	~~IIII~~		5
COBBLE	Small	64 – 90	III		3
	Small	90 – 128	IIII	II	6
	Large	128 – 180	II		2
	Large	180 – 256	IIII		4
BOULDER	Small	256 – 362	II		2
	Small	362 – 512			
	Medium	512 – 1024	I		1
	Large	1,024 – 2,048			
BEDROCK	Bedrock	> 2,048	~~IIII~~ ~~IIII~~ II	IIII	16
TOTALS			64	36	100

DEP APPENDIX B - LOW GRADIENT STREAM ASSESSMENT PROTOCOL
BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 9:30am
River Basin:	Ohio	Investigators:	MLS, JAD*, JWC

*Collector

Habitat Type	Description	Sample Technique	D-Frame Sample Tally Proposed	D-Frame Sample Tally Actual
Cobble/Gravel Substrate	Stream bottom areas consisting of mixed gravel and larger substrate particles; cobble gravel substrates are typically located in relatively fast flowing, "erosional" areas of the stream channel	Macroinvertebrates are collected by placing the net on the substrate by the downstream end of an area of gravel or larger substrate particles and simultaneously pushing down on the net while pulling it in an upstream direction with adequate force to dislodge substrate particles and the aquatic macroinvertebrates associated with these materials. Large stones and organic material contained in the net are discarded after they are carefully inspected for the presence of attached organisms, which are removed and retained with the remainder of the sample. One jab consists of passing the net over approximately 30 inches of substrate.	3	4
Snag	Snag habitat consists of submerged sticks, branches, and other woody debris that appears to have been submerged long enough to be colonized by aquatic macroinvertebrates. Preferred snags for sampling include small- to medium-sized sticks and branches (preferably about 4 inches in diameter) that have accumulated a substantial amount of organic matter (twigs, leaves, uprooted aquatic macrophytes, etc.) that is colonized by aquatic macroinvertebrates.	When possible, the net is placed immediately downstream of the snag in either the water column or stream bottom in an area where water is flowing through the snag at a moderate velocity. The snag is then kicked in such a manner that aquatic macroinvertebrates and organic matter are dislodged from the snag and carried by the current into the net. If the snag cannot be kicked, then it is sampled by jabbing the net into a downstream area of the snag and moving it in an upstream direction with enough force to dislodge and capture aquatic macroinvertebrates that have colonized the snag. One jab equals an area of approximately 0.23m² (12" X 30")	—	—
Coarse Particulate Organic Matter (CPOM)	CPOM consists of a mix of plant parts (leaves, bark, twigs, seeds, etc.) that have accumulated on the stream bottom in depositional areas of the stream channel. In situations where there is substantial variability in the composition of CPOM deposits within a given sample reach (e.g., deposits consisting primarily of white pine needles and deposits consisting primarily of hardwood tree leaves), a variety of CPOM deposits are sampled. Leaf packs in higher velocity ("erosional") areas of the channel , however, are not included in the CPOM samples	CPOM deposits are sampled by passing the net along a 30-inch-long path through the accumulated organic material so as to collect the material and its associated aquatic macroinvertebrates. When CPOM deposits are extensive, only the upper portion of the accumulated organic material is collected to ensure that the collected material is from the aerobic zone.	3	3
Submerged Aquatic Vegetation (SAV)	SAV habitat consists of rooted aquatic macrophytes.	SAV is sampled by drawing the net in an upstream direction along a 30-inch-long path through the vegetation. Efforts should be made to avoid collecting the stream bottom sediments and organisms when sampling SAV areas.	—	—
Sand/Fine Sediment	Sand/fine sediment habitat includes stream bottom areas that are comprised primarily of sand, silt, and/or clay.	Sand/fine sediment areas are sampled by bumping or tapping the net along the surface of the substrate while slowly drawing the net in an upstream direction along a 30-inch-long path of stream bottom. Efforts should be made to minimize the amount of debris collected in the net by penetrating only the upper-most layer of sand/silt deposits. Excess sand and silt are removed from the sample by repeatedly dipping the net into the water column and lifting it out of the stream to wash fine sediment through the net.	4	3

NOTES:

1. Two samples should be collected from each of the five habitats and all ten net samples are composited into a single sample.
2. If one or more of the habitats to be sampled are absent from the sample reach, redistribute the ten samples among the remaining habitats present in proportion to the quantity of habitat present in the sampling reach.

COMMENTS:

by JAD

FISH SAMPLING FIELD DATA SHEET (PAGE 1)

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 9:45 am
River Basin:	Ohio	Investigators:	HLS, JAD, JWC

Sample Collection	Capture Method: Backpack ✓ Longline ____ Tote Barge ____ Boat ____ Electrofisher Model: Smith Root 12 B Other: F4 Block Nets Used? Yes ____ No ✓ DC ✓ AC ____ Volts 300 Amps 0.18-0.22 Shock Time (sec): 775 Reach Length (ft): 100m Stream Width (ft) : Max 15' Mean 10'

	SPECIES	RIFFLE TALLY	POOL TALLY
	Blacknose Dace		III (3)
	Bluntnose Minnow		
	Creek Chub		III (3)
	Central Stoneroller		
	Common Carp		
	Silverjaw Minnow		
SHINERS	Common Shiner		
SHINERS	Emerald Shiner		
SHINERS	Mimic Shiner		
SHINERS	Rosyface Shiner		
SHINERS	Sand Shiner		
SHINERS	Silver Shiner		
SHINERS	Spotfin Shiner		
SHINERS	Striped Shiner		
	* Archived Minnows		

FISH SAMPLING FIELD DATA SHEET (PAGE 2)

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 9:45am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

	SPECIES	RIFFLE TALLY	POOL TALLY
CATFISH	Yellow Bullhead		
	Channel Catfish		
	Stonecat		
	Brindled Madtom		
DARTERS	Banded Darter		
	Fantail Darter		
	Greenside Darter		
	Johnny Darter		
	Rainbow Darter		
	Variegate Darter		
	Logperch		
SUCKERS	White Sucker		
	Northern Hogsucker		
	Golden Redhorse		
	Black Redhorse		
	* Archived Redhorse Spp.		
PAN and SPORT FISH	Rock Bass		
	Bluegill		
	Pumpkinseed		
	Green Sunfish		
	White Crappie		
	Black Crappie		
	Smallmouth Bass		
	Largemouth Bass		
	Rainbow Trout		
	Brown Trout		

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 9:30am
River Basin:	Ohio	Investigators:	MLS*, JAD, JWC

*scorer

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 12	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 17	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 12	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 9:30am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends) long glide in upstream portion of reach	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 (4) 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 (LB)	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. pasture	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 (LB)	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score 145

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

LOW GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 9:30am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Parameters to be evaluated in sampling reach

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

LOW GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station:	32705-CRDA-BSW01	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 9:30am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Parameters to be evaluated broader than sampling reach

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

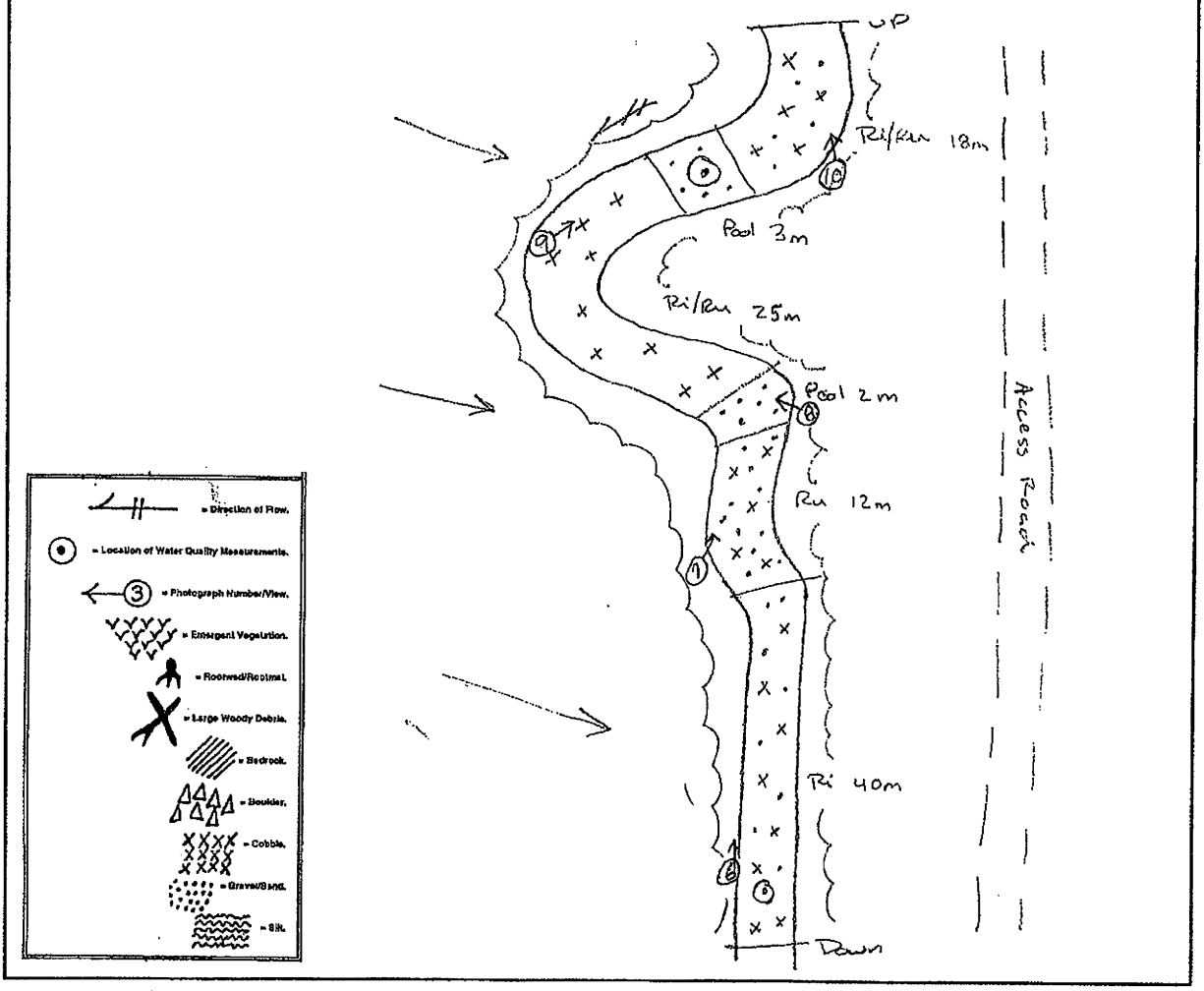
Total Score 131

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 1)

Station: 32705-CRDA-BSW02		Project No.: 071-522.0002	
Stream Name: 32705	Date/Time: 2-8-08		10:45am
River Basin: Ohio	Investigators: MLS, JAD, JWC		

SKETCH MAP



WEATHER CONDITIONS	Air Temperature: _____ C			
	Weather	Now	Past 24 hrs	Past 7 days
	Heavy Rain			1-2"
	Steady Rain			
	Intermit. Rain		light snow	
	% Cloud Cover	100%		
	Clear/Sunny			
	Other:			

HABITAT LENGTHS IN SAMPLING REACH		
Habitat	Length (~~steps~~ m)	Length (ft)
Riffle	95m	
Run		
Pool	5m	
Glide		
Total		

STREAM CHARACTER-IZATION							
	Subsystem:	Perennial ✓	Intermittent ____	Tidal ____			
	Type:	Coldwater ____	Warmwater ✓				
	Origin:	Spring-fed ✓	Wetland ✓	Montane ____	Glacial ____	Mixture ____	Other ____

GPS UNIT USED: GeoXT 3.	CAMERA USED: E	PHOTO NO.S: 6-10

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 2)

Station: 32705-CRDA-BSW02	Project No.: 071-522.0002
Stream Name: 32705	Date/Time: 2-8-08 10:45 am
River Basin: Ohio	Investigators: MLS, JAD, JWC

WATERSHED FEATURES

Predominant Surrounding Landuse
☑ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☐ Other _____
☐ Residential

Local Watershed NPS Pollution
☑ No evidence ☐ Some potential sources
☐ Obvious sources

Local Watershed Erosion
☐ None ☑ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☑ Trees ☐ Shrubs ☐ Grasses ☑ Herbaceous

dominant species present Acer saccharum, Verbesina alternifolia

INSTREAM FEATURES

Estimated Reach Length 100m
Estimated Stream Width 5-7'
Sampling Reach Area _____
Area in km² (m²x1000) _____
Estimated Stream Depth 3-8"
Surface Velocity (at thalweg) _____

Canopy Cover ☐ Open
☐ Partly open ☐ Partly shaded ☑ Shaded

High Water Mark 20"

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle ___% ☐ Run ___% 95%
☐ Pool ___% ☐ Glide ___% 5%

Channelized ☐ Yes ☑ No
Dam Present ☐ Yes ☑ No

STREAM DEPTH:
Riffle/Run = 3-5"
Pool/Glide = 5-8"

LARGE WOODY DEBRIS

LWD <1%
Density of LWD _____

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
☐ Floating Algae ☐ Attached Algae

dominant species present None

Portion of the reach with aquatic vegetation N/A

WATER QUALITY

POOL:	RIFFLE:
Temperature = 5.1°C	Temperature = 5.1 °C
Conductivity = 289 µS	Conductivity = 287 µS
Dissolved Oxygen = 10.6mg/L	Dissolved Oxygen = 11.51 mg/l
pH = 7.41	pH = 7.37

Water Odors
☑ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other _____

Water Surface Oils
☐ Slick ☐ Sheen ☐ Globs ☐ Flecks
☑ None ☐ Other _____

Turbidity (if not measured)
☑ Clear ☐ Slightly turbid ☐ Turbid
☐ Opaque ☐ Stained ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
☑ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☐ None
☐ Other _____

Oils
☑ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
☐ Sludge ☐ Sawdust ☐ Paper fiber ☑ Sand
☐ Relict shells ☐ Other _____

Looking at stones which are not deeply embedded, are the undersides black in color?
☐ Yes ☑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)				ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach		Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock				Detritus	sticks, wood, coarse plant materials (CPOM)	<2%
Boulder	> 256 mm (10")					
Cobble	64-256 mm (2.5"-10")	40		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	40	20			
Sand	0.06-2mm (gritty)	20	70	Marl	grey, shell fragments	
Silt	0.004-0.06 mm		10			
Clay	< 0.004 mm (slick)					

STREAM DISCHARGE FIELD DATA FORM

Station:	32705-CRDA-BSW02	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 11:00am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC
Method: Midsection, current meter method		Flow Meter (Model and No.):	Marsh McBirney Flow mate
Stream Wetted Width:	6.0 feet	Starting Point:	(RDB) LDB

Distance (ft)[1]	Width (ft)[2]	Depth (ft)[3]	Observation Depth[4]	Velocity (ft/s)	Notes/Comments
0.25	0.5	0.10	0.6	0.03	
0.75	0.5	0.25	0.6	0.48	
1.25	0.5	0.25	0.6	1.14	
1.75	0.5	0.15	0.6	0.94	
2.25	0.5	0.15	0.6	1.22	
2.75	0.5	0.20	0.6	1.20	
3.25	0.5	0.10	0.6	0.85	
3.75	0.5	0.10	0.6	1.02	
4.25	0.5	0.35	0.6	1.59	
4.75	0.5	0.40	0.6	2.07	
5.25	0.5	0.30	0.6	0.81	
5.75	0.5	0.15	0.6	0.00	
					Discharge- 1.39 cfs, 625 gpm

[1] Distance from starting point on stream bank to velocity and depth measurement midpoint or "observation vertical"

[2] Width of measurement section; see Figure 1, sketch of midsection method, for width computation equations

[3] Depth at velocity measurement midpoint or "observation vertical"

[4] Observation depth of velocity measurement - either 0.6 depth (one point method) or 0.2 and 0.8 depth (two point method)

PEBBLE COUNT FIELD DATA SHEET

Station:	32705-CRDA-BSW02	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 1200
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Particle	Description	Size (mm)	Particle Count: Riffle/Run	Particle Count: Pool/Glide	TOTAL
FINES	Silt/Clay	< 0.062	5	2	7
SAND	Very Fine	0.062 – 0.125	1		1
	Fine	0.125 – 0.25	1	1	2
	Medium	0.25 – 0.5	2	1	3
	Coarse	0.5 – 1.0	5		5
	Very Coarse	1.0 – 2.0	2	1	3
GRAVEL	Very Fine	2.0 – 4.0	2	1	3
	Fine	4.0 – 5.7			
	Fine	5.7 – 8.0	3		3
	Medium	8.0 – 11.3	4		4
	Medium	11.3 – 16.0	7	1	8
	Coarse	16.0 – 22.6	13		13
	Coarse	22.6 – 32	15	1	16
	Very Coarse	32 – 45	7	1	8
	Very Coarse	45 – 64	13		13
COBBLE	Small	64 – 90	5		5
	Small	90 – 128	3		3
	Large	128 – 180			
	Large	180 – 256	1		1
BOULDER	Small	256 – 362	1		1
	Small	362 – 512			
	Medium	512 – 1024	1		1
	Large	1,024 – 2,048			
BEDROCK	Bedrock	> 2,048			
TOTALS			91	9	100

DEP APPENDIX B - LOW GRADIENT STREAM ASSESSMENT PROTOCOL
BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

Station:	32705-CRDA-BSW02	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 11:00am
River Basin:	Ohio	Investigators:	MLS, JAD*, JWC *collector

Habitat Type	Description	Sample Technique	D-Frame Sample Tally Proposed	D-Frame Sample Tally Actual
Cobble/Gravel Substrate	Stream bottom areas consisting of mixed gravel and larger substrate particles; cobble gravel substrates are typically located in relatively fast flowing, "erosional" areas of the stream channel	Macroinvertebrates are collected by placing the net on the substrate by the downstream end of an area of gravel or larger substrate particles and simultaneously pushing down on the net while pulling it in an upstream direction with adequate force to dislodge substrate particles and the aquatic macroinvertebrates associated with these materials. Large stones and organic material contained in the net are discarded after they are carefully inspected for the presence of attached organisms, which are removed and retained with the remainder of the sample. One jab consists of passing the net over approximately 30 inches of substrate.	3	4
Snag	Snag habitat consists of submerged sticks, branches, and other woody debris that appears to have been submerged long enough to be colonized by aquatic macroinvertebrates. Preferred snags for sampling include small- to medium-sized sticks and branches (preferably about 4 inches in diameter) that have accumulated a substantial amount of organic matter (twigs, leaves, uprooted aquatic macrophytes, etc.) that is colonized by aquatic macroinvertebrates.	When possible, the net is placed immediately downstream of the snag in either the water column or stream bottom in an area where water is flowing through the snag at a moderate velocity. The snag is then kicked in such a manner that aquatic macroinvertebrates and organic matter are dislodged from the snag and carried by the current into the net. If the snag cannot be kicked, then it is sampled by jabbing the net into a downstream area of the snag and moving it in an upstream direction with enough force to dislodge and capture aquatic macroinvertebrates that have colonized the snag. One jab equals an area of approximately 0.23m^2 (12" X 30")	—	—
Coarse Particulate Organic Matter (CPOM)	CPOM consists of a mix of plant parts (leaves, bark, twigs, seeds, etc.) that have accumulated on the stream bottom in depositional areas of the stream channel. In situations where there is substantial variability in the composition of CPOM deposits within a given sample reach (e.g., deposits consisting primarily of white pine needles and deposits consisting primarily of hardwood tree leaves), a variety of CPOM deposits are sampled. Leaf packs in higher velocity ("erosional") areas of the channel , however, are not included in the CPOM samples	CPOM deposits are sampled by passing the net along a 30-inch-long path through the accumulated organic material so as to collect the material and its associated aquatic macroinvertebrates. When CPOM deposits are extensive, only the upper portion of the accumulated organic material is collected to ensure that the collected material is from the aerobic zone.	3	3
Submerged Aquatic Vegetation (SAV)	SAV habitat consists of rooted aquatic macrophytes.	SAV is sampled by drawing the net in an upstream direction along a 30-inch-long path through the vegetation. Efforts should be made to avoid collecting the stream bottom sediments and organisms when sampling SAV areas.	—	—
Sand/Fine Sediment	Sand/fine sediment habitat includes stream bottom areas that are comprised primarily of sand, silt, and/or clay.	Sand/fine sediment areas are sampled by bumping or tapping the net along the surface of the substrate while slowly drawing the net in an upstream direction along a 30-inch-long path of stream bottom. Efforts should be made to minimize the amount of debris collected in the net by penetrating only the upper-most layer of sand/silt deposits. Excess sand and silt are removed from the sample by repeatedly dipping the net into the water column and lifting it out of the stream to wash fine sediment through the net.	4	4

NOTES:

1. Two samples should be collected from each of the five habitats and all ten net samples are composited into a single sample.
2. If one or more of the habitats to be sampled are absent from the sample reach, redistribute the ten samples among the remaining habitats present in proportion to the quantity of habitat present in the sampling reach.

COMMENTS:

FISH SAMPLING FIELD DATA SHEET (PAGE 1)

Station:	32705-CRDA-BSW02	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 11:30am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Sample Collection	Capture Method: Backpack ✓ Longline ____ Tote Barge ____ Boat ____
	Electrofisher Model: Smith Root 12B
	Other: E6 Block Nets Used? Yes ____ No ✓
	DC ✓ AC ____ Volts 200 Amps 0.22 Shock Time (sec): 398
	Reach Length (ft): 100m Stream Width (ft) : Max 7 Mean 5

	SPECIES	RIFFLE TALLY	POOL TALLY
	Blacknose Dace	NO Fish	No Fish
	Bluntnose Minnow		
	Creek Chub		
	Central Stoneroller		
	Common Carp		
	Silverjaw Minnow		
SHINERS	Common Shiner		
SHINERS	Emerald Shiner		
SHINERS	Mimic Shiner		
SHINERS	Rosyface Shiner		
SHINERS	Sand Shiner		
SHINERS	Silver Shiner		
SHINERS	Spotfin Shiner		
SHINERS	Striped Shiner		
	* Archived Minnows		

FISH SAMPLING FIELD DATA SHEET (PAGE 2)

Station:	32705-CRDA-BSW02	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 11:30am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

	SPECIES	RIFFLE TALLY	POOL TALLY
CATFISH	Yellow Bullhead		
	Channel Catfish		
	Stonecat		
	Brindled Madtom		
DARTERS	Banded Darter		
	Fantail Darter		
	Greenside Darter		
	Johnny Darter		
	Rainbow Darter		
	Variegate Darter		
	Logperch		
SUCKERS	White Sucker		
	Northern Hogsucker		
	Golden Redhorse		
	Black Redhorse		
	* Archived Redhorse Spp.		
PAN and SPORT FISH	Rock Bass		
	Bluegill		
	Pumpkinseed		
	Green Sunfish		
	White Crappie		
	Black Crappie		
	Smallmouth Bass		
	Largemouth Bass		
	Rainbow Trout		
	Brown Trout		

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station:	32705-CRDA-BSW02	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 11:00am
River Basin:	Ohio	Investigators:	HLS, JAD, JWC

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 12	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness • heavy bed load	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 12	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime • Primarily fast-deep & fast-shallow	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station:	32705-CRDA-BSW02	Project No.:	071-522.0002
Stream Name:	32705	Date/Time:	2-8-08 11:00 am
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 18	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 (4) 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0
9. Vegetative Protection (score each bank) • Forest w/ shrub understory	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. paved road	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

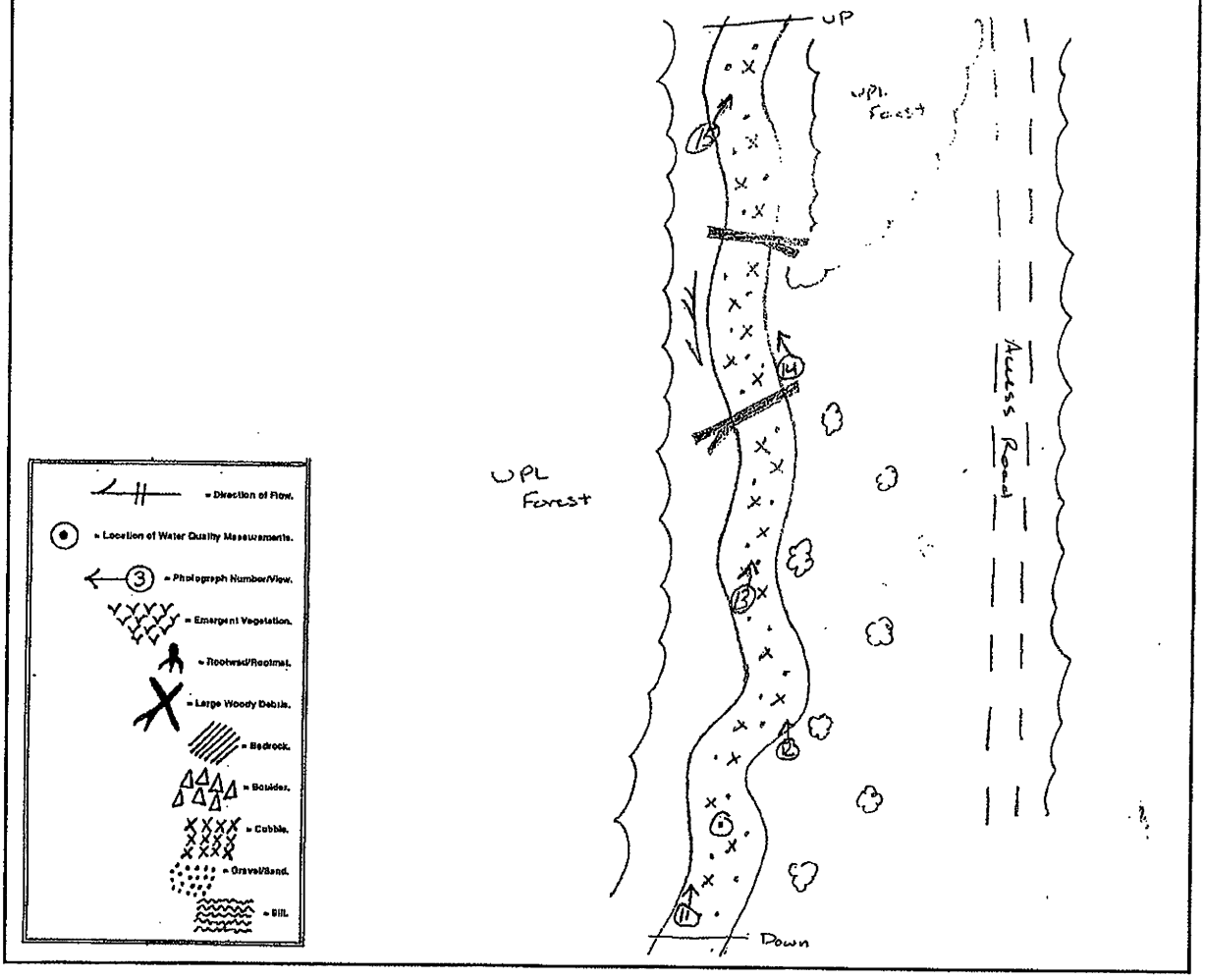
Total Score 140

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 1)

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time: 2-8-08	1:15pm
River Basin:	Ohio	Investigators: HLS, JAD, JWC	

SKETCH MAP



WEATHER CONDITIONS	Air Temperature: 35° ~~C~~ F			
	Weather	Now	Past 24 hrs	Past 7 days
	Heavy Rain			1-2"
	Steady Rain			
	Intermit. Rain		light snow	
	% Cloud Cover	100		
	Clear/Sunny			
	Other:			

HABITAT LENGTHS IN SAMPLING REACH

Habitat	Length (steps)	Length (ft)
Riffle	100m	
Run		
Pool		
Glide		
Total		

STREAM CHARACTER-IZATION							
	Subsystem:	Perennial ✓	Intermittent ___	Tidal ___			
	Type:	Coldwater ___	Warmwater ✓				
	Origin:	Spring-fed ✓	Wetland ✓	Montane ___	Glacial ___	Mixture ___	Other ___

GPS UNIT USED: GeoXT3	CAMERA USED: E	PHOTO NO.S: 11-15

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 2)

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time:	2-8-08 1:15 pm
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

WATERSHED FEATURES

Predominant Surrounding Landuse
- ☒ Forest
- ☒ Field/Pasture (OW)
- ☐ Agricultural
- ☐ Residential
- ☐ Commercial
- ☐ Industrial
- ☐ Other _____

Local Watershed NPS Pollution
- ☒ No evidence
- ☐ Some potential sources
- ☐ Obvious sources

Local Watershed Erosion
- ☐ None
- ☒ Moderate
- ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
- ☒ Trees
- ☐ Shrubs
- ☒ Grasses
- ☐ Herbaceous

dominant species present Acer saccharum, Poa sp.

INSTREAM FEATURES

Estimated Reach Length 100m

Estimated Stream Width 4-6

Sampling Reach Area _____

Area in km² (m²x1000) _____

Estimated Stream Depth 2-5

Surface Velocity (at thalweg) _____

Canopy Cover
- ☐ Open
- ☐ Partly open
- ☐ Partly shaded
- ☒ Shaded

High Water Mark 12"

Proportion of Reach Represented by Stream Morphology Types
- ☐ Riffle ___ %
- ☐ Run ___ % 100%
- ☐ Pool ___ %
- ☐ Glide ___ % 0%

Channelized ☐ Yes ☒ No

Dam Present ☐ Yes ☒ No

STREAM DEPTH:

Riffle/Run = 2-5

Pool/Glide = N/A

LARGE WOODY DEBRIS

LWD 1%

Density of LWD _____

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
- ☐ Rooted emergent
- ☐ Rooted submergent
- ☐ Rooted floating
- ☐ Free floating
- ☐ Floating Algae
- ☐ Attached Algae

dominant species present N/A

Portion of the reach with aquatic vegetation N/A

WATER QUALITY

POOL:

Temperature = N/A

Conductivity = N/A

Dissolved Oxygen = N/A

pH = N/A

RIFFLE:

Temperature = 5.3°C

Conductivity = 101 us

Dissolved Oxygen = 10.44 mg/L

pH = 7.01

Water Odors
- ☒ Normal/None
- ☐ Petroleum
- ☐ Fishy
- ☐ Sewage
- ☐ Chemical
- ☐ Other _____

Water Surface Oils
- ☐ Slick
- ☐ Sheen
- ☐ Globs
- ☐ Flecks
- ☒ None
- ☐ Other _____

Turbidity (if not measured)
- ☒ Clear
- ☐ Slightly turbid
- ☐ Turbid
- ☐ Opaque
- ☐ Stained
- ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
- ☒ Normal
- ☐ Sewage
- ☐ Petroleum
- ☐ Chemical
- ☐ Anaerobic
- ☐ None
- ☐ Other _____

Oils
- ☒ Absent
- ☐ Slight
- ☐ Moderate
- ☐ Profuse

Deposits
- ☐ Sludge
- ☐ Sawdust
- ☐ Paper fiber
- ☒ Sand
- ☐ Relict shells
- ☐ Other _____

Looking at stones which are not deeply embedded, are the undersides black in color?
- ☐ Yes
- ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	5%
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")	40	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	40			
Sand	0.06-2mm (gritty)	20	Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

STREAM DISCHARGE FIELD DATA FORM

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time:	2-8-08 1:20pm
River Basin:	Ohio	Investigators:	MLS, JAD, JWC
Method: Midsection, current meter method		Flow Meter (Model and No.):	Marsh McBirney Flowmate
Stream Wetted Width:	4.0 feet	Starting Point:	(RDB) LDB

Distance (ft)[1]	Width (ft)[2]	Depth (ft)[3]	Observation Depth[4]	Velocity (ft/s)	Notes/Comments
0.25	0.5	0.1	0.6	0	
0.75	0.5	0.1	0.6	0.35	
1.25	0.5	0.1	0.6	0.31	
1.75	0.5	0.1	0.6	0.49	
2.25	0.5	0.1	0.6	0.60	
2.75	0.5	0.2	0.6	0.80	
3.25	0.5	0.25	0.6	1.08	
3.75	0.5	0.10	0.6	0.77	
					Discharge 0.34 cfs, 153gpm

[1] Distance from starting point on stream bank to velocity and depth measurement midpoint or "observation vertical"

[2] Width of measurement section; see Figure 1, sketch of midsection method, for width computation equations

[3] Depth at velocity measurement midpoint or "observation vertical"

[4] Observation depth of velocity measurement - either 0.6 depth (one point method) or 0.2 and 0.8 depth (two point method)

PEBBLE COUNT FIELD DATA SHEET

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time:	2-8-08 2:00 pm
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Particle	Description	Size (mm)	Particle Count: Riffle/Run	Particle Count: Pool/Glide	TOTAL
FINES	Silt/Clay	< 0.062	I		1
SAND	Very Fine	0.062 – 0.125			
	Fine	0.125 – 0.25			
	Medium	0.25 – 0.5	II		2
	Coarse	0.5 – 1.0	III		3
	Very Coarse	1.0 – 2.0	I		1
GRAVEL	Very Fine	2.0 – 4.0	I		1
	Fine	4.0 – 5.7	III		3
	Fine	5.7 – 8.0	III		3
	Medium	8.0 – 11.3	~~IIII~~ ~~IIII~~ I		11
	Medium	11.3 – 16.0	~~IIII~~ ~~IIII~~		10
	Coarse	16.0 – 22.6	IIII		4
	Coarse	22.6 – 32	~~IIII~~ ~~IIII~~		10
	Very Coarse	32 – 45	~~IIII~~ ~~IIII~~ III		13
	Very Coarse	45 – 64	~~IIII~~ ~~IIII~~ I		11
COBBLE	Small	64 – 90	~~IIII~~ IIII		9
	Small	90 – 128	~~IIII~~ ~~IIII~~		10
	Large	128 – 180	IIII		4
	Large	180 – 256	I		1
BOULDER	Small	256 – 362	II		2
	Small	362 – 512	I		1
	Medium	512 – 1024			
	Large	1,024 – 2,048			
BEDROCK	Bedrock	> 2,048			
TOTALS			100	0	100

DEP APPENDIX B - LOW GRADIENT STREAM ASSESSMENT PROTOCOL
BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time:	2-8-08 1:30pm
River Basin:	Ohio	Investigators:	MLS, JAD*, JWG *Collector

Habitat Type	Description	Sample Technique	D-Frame Sample Tally Proposed	D-Frame Sample Tally Actual
Cobble/Gravel Substrate	Stream bottom areas consisting of mixed gravel and larger substrate particles; cobble gravel substrates are typically located in relatively fast flowing, "erosional" areas of the stream channel	Macroinvertebrates are collected by placing the net on the substrate by the downstream end of an area of gravel or larger substrate particles and simultaneously pushing down on the net while pulling it in an upstream direction with adequate force to dislodge substrate particles and the aquatic macroinvertebrates associated with these materials. Large stones and organic material contained in the net are discarded after they are carefully inspected for the presence of attached organisms, which are removed and retained with the remainder of the sample. One jab consists of passing the net over approximately 30 inches of substrate.	5	5
Snag	Snag habitat consists of submerged sticks, branches, and other woody debris that appears to have been submerged long enough to be colonized by aquatic macroinvertebrates. Preferred snags for sampling include small- to medium-sized sticks and branches (preferably about 4 inches in diameter) that have accumulated a substantial amount of organic matter (twigs, leaves, uprooted aquatic macrophytes, etc.) that is colonized by aquatic macroinvertebrates.	When possible, the net is placed immediately downstream of the snag in either the water column or stream bottom in an area where water is flowing through the snag at a moderate velocity. The snag is then kicked in such a manner that aquatic macroinvertebrates and organic matter are dislodged from the snag and carried by the current into the net. If the snag cannot be kicked, then it is sampled by jabbing the net into a downstream area of the snag and moving it in an upstream direction with enough force to dislodge and capture aquatic macroinvertebrates that have colonized the snag. One jab equals an area of approximately 0.23m^2 (12" X 30")	—	—
Coarse Particulate Organic Matter (CPOM)	CPOM consists of a mix of plant parts (leaves, bark, twigs, seeds, etc.) that have accumulated on the stream bottom in depositional areas of the stream channel. In situations where there is substantial variability in the composition of CPOM deposits within a given sample reach (e.g., deposits consisting primarily of white pine needles and deposits consisting primarily of hardwood tree leaves), a variety of CPOM deposits are sampled. Leaf packs in higher velocity ("erosional") areas of the channel , however, are not included in the CPOM samples	CPOM deposits are sampled by passing the net along a 30-inch-long path through the accumulated organic material so as to collect the material and its associated aquatic macroinvertebrates. When CPOM deposits are extensive, only the upper portion of the accumulated organic material is collected to ensure that the collected material is from the aerobic zone.	3	3
Submerged Aquatic Vegetation (SAV)	SAV habitat consists of rooted aquatic macrophytes.	SAV is sampled by drawing the net in an upstream direction along a 30-inch-long path through the vegetation. Efforts should be made to avoid collecting the stream bottom sediments and organisms when sampling SAV areas.	—	—
Sand/Fine Sediment	Sand/fine sediment habitat includes stream bottom areas that are comprised primarily of sand, silt, and/or clay.	Sand/fine sediment areas are sampled by bumping or tapping the net along the surface of the substrate while slowly drawing the net in an upstream direction along a 30-inch-long path of stream bottom. Efforts should be made to minimize the amount of debris collected in the net by penetrating only the upper-most layer of sand/silt deposits. Excess sand and silt are removed from the sample by repeatedly dipping the net into the water column and lifting it out of the stream to wash fine sediment through the net.	2	2

NOTES:

1. Two samples should be collected from each of the five habitats and all ten net samples are composited into a single sample.
2. If one or more of the habitats to be sampled are absent from the sample reach, redistribute the ten samples among the remaining habitats present in proportion to the quantity of habitat present in the sampling reach.

COMMENTS:

- No pool present

FISH SAMPLING FIELD DATA SHEET (PAGE 1)

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time:	2-8-08 1:50pm
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Sample Collection	Capture Method: Backpack ✓ Longline ____ Tote Barge ____ Boat ____
	Electrofisher Model: Smith Root 12B
	Other: E6 Block Nets Used? Yes ____ No ✓
	DC ✓ AC ____ Volts 400 Amps 0.19 Shock Time (sec): 393
	Reach Length ~~(ft)~~: 100m Stream Width (ft) : Max 6 Mean 5

	SPECIES	RIFFLE TALLY	POOL TALLY
	Blacknose Dace	NO FISH	NO FISH
	Bluntnose Minnow		
	Creek Chub		
	Central Stoneroller		
	Common Carp		
	Silverjaw Minnow		
SHINERS	Common Shiner		
SHINERS	Emerald Shiner		
SHINERS	Mimic Shiner		
SHINERS	Rosyface Shiner		
SHINERS	Sand Shiner		
SHINERS	Silver Shiner		
SHINERS	Spotfin Shiner		
SHINERS	Striped Shiner		
	* Archived Minnows		

FISH SAMPLING FIELD DATA SHEET (PAGE 2)

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time:	2-8-08 1:50pm
River Basin:	Ohio	Investigators:	MLS, JATD, JWC

	SPECIES	RIFFLE TALLY	POOL TALLY
CATFISH	Yellow Bullhead		
	Channel Catfish		
	Stonecat		
	Brindled Madtom		
DARTERS	Banded Darter		
	Fantail Darter		
	Greenside Darter		
	Johnny Darter		
	Rainbow Darter		
	Variegate Darter		
	Logperch		
SUCKERS	White Sucker		
	Northern Hogsucker		
	Golden Redhorse		
	Black Redhorse		
	* Archived Redhorse Spp.		
PAN and SPORT FISH	Rock Bass		
	Bluegill		
	Pumpkinseed		
	Green Sunfish		
	White Crappie		
	Black Crappie		
	Smallmouth Bass		
	Largemouth Bass		
	Rainbow Trout		
	Brown Trout		

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time:	2-8-08 2:20 pm
River Basin:	Ohio	Investigators:	MLS*, JAD, JWC

*Completed Form

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 15	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low). • No slow-deep or slow-shallow	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 14	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station:	(UNT-OR)-CRDA-BSW03	Project No.:	071-522.0002
Stream Name:	Unnamed Tributary to Owens Run (UNT-OR)	Date/Time:	2-8-08 2:20 pm
River Basin:	Ohio	Investigators:	MLS, JAD, JWC

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15. • Continuous riffle w/ few boulders	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 15	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE 8 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	(5) 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 (LB)	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

↳ Historic clearing & access road

Total Score 144

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

STREAM BIOLOGICAL SAMPLING STATION PHOTOGRAPHS
BAILEY MINE CRDA NO. 5 AND 6

Photograph 1: Station 32705-CRDA-BSW01
2/8/2008

Photograph 2: Station 32705-CRDA-BSW01
2/8/2008

Photograph 3: Station 32705-CRDA-BSW02
2/8/2008

Photograph 4: Station 32705-CRDA-BSW02
2/8/2008

Photograph 5: Station (UNT-OR)-CRDA-BSW03
2/8/2008

Photograph 6: Station (UNT-OR)-CRDA-BSW03
2/8/2008

APPENDIX B

WET 2.1 SUMMARY DATA

Appendix B
Wetland Evaluation Techique (WET 2.1) Results
Bailey Mine Coal Refuse Disposal Areas No. 5 and 6
Richhill Township, Greene County, Pennsylvania
Consol Pennsylvania Coal Company LLC
CEC Project No. 071-522

Wetland Name Landscape Position size class Cowardin Classification	**Wetland 127 (0.056 acre)** Groundwater Slope <0.1 acres Palustrine Emergent			**Wetland 18 (0.310 acre)** Groundwater Slope 0.1-0.5 acres Palustrine Emergent			**Wetland 123 (0.154 acre)** Groundwater Slope 0.1-0.5 acres Palustrine Emergent			**Wetland 129 (0.644 acre)** Groundwater Slope >0.5 acres Palustrine Emergent			**Wetland 104 (0.013 acre)** High-Gradient Riparian <0.1 acres Palustrine Emergent			**Wetland 24 (0.169 acre)** High-Gradient Riparian 0.1-0.5 acres Palustrine Emergent		
WETLAND FUNCTION/VALUE	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*	L	L	*	L	L	*	L	L	*	L	L	*	L	L	*
Ground Water Discharge	L	L	*	L	L	*	L	L	*	L	L	*	L	L	*	L	L	*
Floodflow Alteration	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M
Sediment Stabilization	L	L	*	L	M	*	L	M	*	L	M	*	L	L	*	L	M	*
Sediment/Toxicant Retention	L	L	M	L	H	M	L	L	L	L	L	M	L	L	L	L	L	M
Nutrient Removal/Transformation	L	H	M	L	H	M	L	M	L	L	H	M	L	H	L	L	H	M
Production Export	*	M	*	*	L	*	*	M	*	*	M	*	*	M	*	*	M	*
Wildlife Diversity/Abundance	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*
Wildlife D/A Breeding	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*
Wildlife D/A Migration	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*
Wildlife D/A Wintering	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*
Aquatic Diversity/Abundance	L	L	*	L	M	*	L	M	*	L	M	*	L	L	*	L	L	*
Uniqueness/Heritage	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*
Recreation	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*

Wetland Name Landscape Position size class Cowardin Classification	**Wetland 4 (0.028 acre)** Low-Gradient Riparian <0.1 acres Palstrine Emergent			**Wetland 101 (0.007 acre)** Low-Gradient Riparian <0.1 acres Palustrine Emergent/Scrub-Shrub			**Wetland 11 (0.161 acre)** Low-Gradient Riparian 0.1-0.5 acre Palustrine Emergent			**Wetland 8 + 8A (0.450 acre)** Low-Gradient Riparian 0.1-0.5 acre Palustrine Emergent/Forest			**Wetland 100 + 100A (0.623 acre)** Low-Gradient Riparian >0.5 acres Palustrine Emergent/Forest		
WETLAND FUNCTION/VALUE	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*	L	L	*	L	L	*	L	L	*	L	L	*
Ground Water Discharge	L	L	*	L	L	*	L	L	*	L	L	*	L	L	*
Floodflow Alteration	L	L	M	L	H	M	L	L	M	L	H	M	L	H	M
Sediment Stabilization	L	L	*	L	L	*	L	M	*	L	M	*	L	M	*
Sediment/Toxicant Retention	L	L	M	L	L	L	L	L	M	L	H	M	L	H	M
Nutrient Removal/Transformation	L	H	M	L	H	L	L	H	M	L	H	M	L	H	M
Production Export	*	M	*	*	M	*	*	M	*	*	M	*	*	M	*
Wildlife Diversity/Abundance	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*
Wildlife D/A Breeding	*	L	*	*	L	*	*	L	*	*	H	*	*	H	*
Wildlife D/A Migration	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*
Wildlife D/A Wintering	*	L	*	*	L	*	*	L	*	*	L	*	*	L	*
Aquatic Diversity/Abundance	L	L	*	L	L	*	L	L	*	L	L	*	L	L	*
Uniqueness/Heritage	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*
Recreation	L	*	*	L	*	*	L	*	*	L	*	*	L	*	*

U = Indicates that the program is uncertain of the resources ability to provide the specified ecological function.
* = Indicated that function or value was not evaluated.
L = Low: Indicates that resource is ranked as having a low ability to provide the specified ecological function.
M = Moderate: Indicates that resource is ranked as having a moderate ability to provide the specified ecological function.
H = High: Indicates that resource is ranked as having a high or optimal ability to provide the specified ecological function.

****

Summary of Evaluation Results for "WET127"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	L	*
Sediment/Toxicant Retention	L	L	M
Nutrient Removal/Transformation	L	H	M
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - n
8.2 - n
8.3 - n
8.4 - y
9.1 - y
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - n
11(w) - n
11(d) - n
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - n
12Da(w) - n
12Da(d) - n
12Db(x) - y
12Db(w) - y
12Db(d) - y
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - n
13D(w) - n
13D(d) - n
13Da(x) - n
13Da(w) - n
13Da(d) - n
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - i
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET127"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - n
19.1A - i
19.1B - n
19.2 - n
19.3 - i
20.1 - i
20.2 - i
21A - n
21B - n
21C - n
21D - y
21E - n
22.1.1 - n
22.1.2 - i
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - i
25.2B - i
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - y
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - n
31.2(w) - n
31.2(d) - n
31.3(x) - n
31.3(w) - n
31.3(d) - n
31.4(x) - i
31.4(w) - i
31.4(d) - i
31.5(x) - y
31.5(w) - y
31.5(d) - y
31.6A(x) - y
31.6A(w) - y
31.6A(d) - y
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - n
31.6E(w) - n
31.6E(d) - n
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - i
36.1.1(x) - n
36.1.1(w) - n
36.1.1(d) - n
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - n
36.2.1(w) - n
36.2.1(d) - n
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - n
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET127"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - n	58 - u
46B(x) - n	48D(d) - n	50(w) - n	59.1 - u
46B(w) - n	48E(x) - n	50(d) - n	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - 1
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

****

Summary of Evaluation Results for "WET18"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	M	*
Sediment/Toxicant Retention	L	H	M
Nutrient Removal/Transformation	L	H	M
Production Export	*	L	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	M	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - n
8.2 - n
8.3 - n
8.4 - n
9.1 - n
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - n
11(w) - n
11(d) - n
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - n
12Da(w) - n
12Da(d) - n
12Db(x) - y
12Db(w) - y
12Db(d) - y
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - n
13D(w) - n
13D(d) - n
13Da(x) - n
13Da(w) - n
13Da(d) - n
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - i
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET18"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - y
19.1A - i
19.1B - n
19.2 - n
19.3 - i
20.1 - i
20.2 - i
21A - n
21B - n
21C - n
21D - y
21E - n
22.1.1 - n
22.1.2 - i
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - i
25.2B - i
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - y
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - n
31.2(w) - n
31.2(d) - n
31.3(x) - n
31.3(w) - n
31.3(d) - n
31.4(x) - i
31.4(w) - i
31.4(d) - i
31.5(x) - y
31.5(w) - y
31.5(d) - y
31.6A(x) - y
31.6A(w) - n
31.6A(d) - n
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - n
31.6E(w) - n
31.6E(d) - n
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - i
36.1.1(x) - n
36.1.1(w) - n
36.1.1(d) - n
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - n
36.2.1(w) - n
36.2.1(d) - n
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - n
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET18"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - n	58 - u
46B(x) - n	48D(d) - n	50(w) - n	59.1 - u
46B(w) - n	48E(x) - n	50(d) - n	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

****

Summary of Evaluation Results for "WET123"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	M	*
Sediment/Toxicant Retention	L	L	L
Nutrient Removal/Transformation	L	M	L
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	M	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - n
8.2 - n
8.3 - n
8.4 - y
9.1 - y
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - n
11(w) - n
11(d) - n
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - n
12Da(w) - n
12Da(d) - n
12Db(x) - y
12Db(w) - y
12Db(d) - y
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - n
13D(w) - n
13D(d) - n
13Da(x) - n
13Da(w) - n
13Da(d) - n
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - i
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET123"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - y
19.1A - i
19.1B - n
19.2 - n
19.3 - i
20.1 - i
20.2 - i
21A - y
21B - n
21C - n
21D - n
21E - n
22.1.1 - n
22.1.2 - i
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - n
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - i
25.2B - i
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - y
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - n
31.2(w) - n
31.2(d) - n
31.3(x) - n
31.3(w) - n
31.3(d) - n
31.4(x) - i
31.4(w) - i
31.4(d) - i
31.5(x) - y
31.5(w) - y
31.5(d) - y
31.6A(x) - y
31.6A(w) - n
31.6A(d) - n
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - n
31.6E(w) - n
31.6E(d) - n
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - i
36.1.1(x) - n
36.1.1(w) - n
36.1.1(d) - n
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - n
36.2.1(w) - n
36.2.1(d) - n
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - n
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - n
45B - y
45C - n

WET Answer Dataset for "WET123"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - y	58 - u
46B(x) - n	48D(d) - n	50(w) - y	59.1 - u
46B(w) - n	48E(x) - n	50(d) - y	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

****

Summary of Evaluation Results for "WET129"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	M	*
Sediment/Toxicant Retention	L	L	M
Nutrient Removal/Transformation	L	H	M
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	M	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - n
8.2 - n
8.3 - n
8.4 - y
9.1 - n
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - n
11(w) - n
11(d) - n
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - y
12Da(w) - y
12Da(d) - y
12Db(x) - n
12Db(w) - n
12Db(d) - n
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - n
13D(w) - n
13D(d) - n
13Da(x) - n
13Da(w) - n
13Da(d) - n
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - i
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET129"

16A(d) - y	31.3(x) - n	36.1.1(x) - n	43B(d) - n
16B(x) - n	31.3(w) - n	36.1.1(w) - n	43C(x) - n
16B(w) - n	31.3(d) - n	36.1.1(d) - n	43C(w) - n
16B(d) - n	31.4(x) - i	36.1.2(x) - n	43C(d) - n
16C(x) - n	31.4(w) - i	36.1.2(w) - n	43D(x) - n
16C(w) - n	31.4(d) - i	36.1.2(d) - n	43D(w) - n
16C(d) - n	31.5(x) - y	36.2.1(x) - n	43D(d) - n
17 - n	31.5(w) - y	36.2.1(w) - n	43E(x) - n
18 - y	31.5(d) - y	36.2.1(d) - n	43E(w) - n
19.1A - i	31.6A(x) - y	36.2.2(x) - n	43E(d) - n
19.1B - n	31.6A(w) - n	36.2.2(w) - n	43F(x) - n
19.2 - n	31.6A(d) - n	36.2.2(d) - n	43F(w) - n
19.3 - i	31.6B(x) - n	36.2.3(x) - n	43F(d) - n
20.1 - i	31.6B(w) - n	36.2.3(w) - n	43G(x) - n
20.2 - i	31.6B(d) - n	36.2.3(d) - n	43G(w) - n
21A - n	31.6C(x) - n	37 - i	43G(d) - n
21B - n	31.6C(w) - n	38.1 - n	43H(x) - n
21C - n	31.6C(d) - n	38.2 - n	43H(w) - n
21D - y	31.6D(x) - n	38.3 - n	43H(d) - n
21E - n	31.6D(w) - n	38.4 - n	43I(x) - n
22.1.1 - n	31.6D(d) - n	38.5 - n	43I(w) - n
22.1.2 - i	31.6E(x) - n	38.6 - n	43I(d) - n
22.2 - n	31.6E(w) - n	38.7 - n	44A(x) - n
22.3 - n	31.6E(d) - n	38.8 - i	44A(w) - n
23 - n	32A - n	39 - n	44A(d) - n
24.1 - i	32B - n	40.1 - i	44B(x) - n
24.2 - y	32C - n	40.2 - i	44B(w) - n
24.3 - i	32D - n	41.1 - i	44B(d) - n
24.4 - i	32E - y	41.2 - i	44C(x) - n
24.5 - n	32F - n	42.1.1(x) - y	44C(w) - n
25.1 - n	32G - n	42.1.1(w) - y	44C(d) - n
25.2A - i	32H - n	42.1.1(d) - y	44D(x) - n
25.2B - i	32I - n	42.1.2(x) - n	44D(w) - n
25.3 - n	32J - n	42.1.2(w) - n	44D(d) - n
26.1 - n	32K - n	42.1.2(d) - n	44E(x) - n
26.2 - i	33A - n	42.1.3(x) - n	44E(w) - n
26.3 - i	33B - n	42.1.3(w) - n	44E(d) - n
27.1 - n	33C - n	42.1.3(d) - n	44F(x) - n
27.2 - i	33D - n	42.2.1(x) - n	44F(w) - n
27.3 - i	33E - y	42.2.1(w) - n	44F(d) - n
28 - n	33F - n	42.2.1(d) - n	44G(x) - n
29.1 - y	33G - n	42.2.2(x) - n	44G(w) - n
29.2 - n	33H - n	42.2.2(w) - n	44G(d) - n
30(x) - n	33I - n	42.2.2(d) - n	44H(x) - n
30(w) - n	33J - n	42.2.3(x) - n	44H(w) - n
30(d) - n	33K - n	42.2.3(w) - n	44H(d) - n
31.1(x) - y	34.1 - n	42.2.3(d) - n	44I(x) - n
31.1(w) - y	34.2 - n	43A(x) - y	44I(w) - n
31.1(d) - y	34.3.1 - n	43A(w) - y	44I(d) - n
31.2(x) - n	34.3.2 - i	43A(d) - y	45A - y
31.2(w) - n	35.1 - n	43B(x) - n	45B - n
31.2(d) - n	35.2 - i	43B(w) - n	45C - n

WET Answer Dataset for "WET129"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - y	58 - u
46B(x) - n	48D(d) - n	50(w) - y	59.1 - u
46B(w) - n	48E(x) - n	50(d) - y	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

****

Summary of Evaluation Results for "WET104"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	L	*
Sediment/Toxicant Retention	L	L	L
Nutrient Removal/Transformation	L	H	L
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - n
8.2 - y
8.3 - n
8.4 - y
9.1 - n
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - y
11(w) - y
11(d) - y
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - n
12Da(w) - n
12Da(d) - n
12Db(x) - y
12Db(w) - y
12Db(d) - y
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - y
13D(w) - y
13D(d) - y
13Da(x) - n
13Da(w) - n
13Da(d) - n
13Db(x) - y
13Db(w) - y
13Db(d) - y
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - n
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET104"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - n
19.1A - n
19.1B - n
19.2 - n
19.3 - i
20.1 - y
20.2 - n
21A - y
21B - n
21C - n
21D - n
21E - n
22.1.1 - y
22.1.2 - n
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - n
25.2B - n
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - n
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - y
31.2(w) - y
31.2(d) - y
31.3(x) - y
31.3(w) - y
31.3(d) - y
31.4(x) - i
31.4(w) - i
31.4(d) - i
31.5(x) - n
31.5(w) - n
31.5(d) - n
31.6A(x) - n
31.6A(w) - n
31.6A(d) - n
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - y
31.6E(w) - y
31.6E(d) - y
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - y
36.1.1(x) - y
36.1.1(w) - y
36.1.1(d) - y
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - y
36.2.1(w) - y
36.2.1(d) - y
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - n
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET104"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - n	58 - u
46B(x) - n	48D(d) - n	50(w) - n	59.1 - u
46B(w) - n	48E(x) - n	50(d) - n	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

****

Summary of Evaluation Results for "WET24"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	M	*
Sediment/Toxicant Retention	L	L	M
Nutrient Removal/Transformation	L	H	M
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - n
8.2 - y
8.3 - n
8.4 - y
9.1 - y
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - y
11(w) - y
11(d) - y
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - y
12Da(w) - y
12Da(d) - y
12Db(x) - n
12Db(w) - n
12Db(d) - n
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - y
13D(w) - y
13D(d) - y
13Da(x) - y
13Da(w) - y
13Da(d) - y
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - y
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET24"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - n
19.1A - n
19.1B - n
19.2 - n
19.3 - i
20.1 - n
20.2 - n
21A - n
21B - n
21C - n
21D - y
21E - n
22.1.1 - y
22.1.2 - n
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - n
25.2B - n
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - y
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - y
31.2(w) - y
31.2(d) - y
31.3(x) - y
31.3(w) - y
31.3(d) - y
31.4(x) - i
31.4(w) - i
31.4(d) - i
31.5(x) - n
31.5(w) - n
31.5(d) - n
31.6A(x) - n
31.6A(w) - n
31.6A(d) - n
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - y
31.6E(w) - y
31.6E(d) - y
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - y
36.1.1(x) - n
36.1.1(w) - n
36.1.1(d) - n
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - n
36.2.1(w) - n
36.2.1(d) - n
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - n
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET24"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - y	58 - u
46B(x) - n	48D(d) - n	50(w) - y	59.1 - u
46B(w) - n	48E(x) - n	50(d) - y	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

****

Summary of Evaluation Results for "WET4"

****

	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	L	M
Sediment Stabilization	L	L	*
Sediment/Toxicant Retention	L	L	M
Nutrient Removal/Transformation	L	H	M
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - y
8.2 - n
8.3 - y
8.4 - n
9.1 - n
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - y
11(w) - y
11(d) - y
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - y
12Da(w) - y
12Da(d) - y
12Db(x) - n
12Db(w) - n
12Db(d) - n
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - y
13D(w) - y
13D(d) - y
13Da(x) - y
13Da(w) - y
13Da(d) - y
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - n
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET4"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - n
19.1A - i
19.1B - n
19.2 - n
19.3 - i
20.1 - y
20.2 - y
21A - y
21B - n
21C - n
21D - n
21E - n
22.1.1 - y
22.1.2 - y
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - i
25.2B - i
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - n
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - y
31.2(w) - y
31.2(d) - y
31.3(x) - y
31.3(w) - y
31.3(d) - y
31.4(x) - n
31.4(w) - n
31.4(d) - n
31.5(x) - n
31.5(w) - n
31.5(d) - n
31.6A(x) - n
31.6A(w) - n
31.6A(d) - n
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - y
31.6E(w) - y
31.6E(d) - y
32A - n
32B - n
32C - n
32D - y
32E - n
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - y
36.1.1(x) - y
36.1.1(w) - y
36.1.1(d) - y
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - y
36.2.1(w) - y
36.2.1(d) - y
36.2.2(x) - y
36.2.2(w) - y
36.2.2(d) - y
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - y
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET4"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - y	58 - u
46B(x) - n	48D(d) - n	50(w) - y	59.1 - u
46B(w) - n	48E(x) - n	50(d) - y	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

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Summary of Evaluation Results for "WET101"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	L	*
Sediment/Toxicant Retention	L	L	L
Nutrient Removal/Transformation	L	H	L
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - n
8.2 - y
8.3 - n
8.4 - y
9.1 - n
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - y
11(w) - y
11(d) - y
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - y
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - n
12Da(w) - n
12Da(d) - n
12Db(x) - y
12Db(w) - y
12Db(d) - y
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - y
13B(w) - y
13B(d) - y
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - y
13Be(w) - y
13Be(d) - y
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - n
13D(w) - n
13D(d) - n
13Da(x) - n
13Da(w) - n
13Da(d) - n
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - n
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET101"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - n
19.1A - i
19.1B - n
19.2 - n
19.3 - i
20.1 - y
20.2 - n
21A - y
21B - n
21C - n
21D - n
21E - n
22.1.1 - y
22.1.2 - y
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - i
25.2B - i
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - n
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - n
31.2(w) - n
31.2(d) - n
31.3(x) - n
31.3(w) - n
31.3(d) - n
31.4(x) - n
31.4(w) - n
31.4(d) - n
31.5(x) - y
31.5(w) - y
31.5(d) - y
31.6A(x) - y
31.6A(w) - y
31.6A(d) - y
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - n
31.6E(w) - n
31.6E(d) - n
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - y
36.1.1(x) - y
36.1.1(w) - y
36.1.1(d) - y
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - n
36.2.1(w) - n
36.2.1(d) - n
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - y
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET101"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - n	58 - u
46B(x) - n	48D(d) - n	50(w) - n	59.1 - u
46B(w) - n	48E(x) - n	50(d) - n	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

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Summary of Evaluation Results for "WET11"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	L	M
Sediment Stabilization	L	M	*
Sediment/Toxicant Retention	L	L	M
Nutrient Removal/Transformation	L	H	M
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	L	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - i
2.2.2 - i
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - y
8.2 - n
8.3 - y
8.4 - n
9.1 - n
9.2 - n
9.3 - n
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - y
11(w) - y
11(d) - y
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - y
12Da(w) - y
12Da(d) - y
12Db(x) - n
12Db(w) - n
12Db(d) - n
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - n
13A(w) - n
13A(d) - n
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - y
13D(w) - y
13D(d) - y
13Da(x) - y
13Da(w) - y
13Da(d) - y
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - n
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET11"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - y
19.1A - i
19.1B - n
19.2 - n
19.3 - i
20.1 - n
20.2 - n
21A - n
21B - n
21C - n
21D - y
21E - n
22.1.1 - y
22.1.2 - y
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - i
25.2B - i
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - y
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - y
31.2(w) - y
31.2(d) - y
31.3(x) - y
31.3(w) - y
31.3(d) - y
31.4(x) - n
31.4(w) - n
31.4(d) - n
31.5(x) - y
31.5(w) - y
31.5(d) - y
31.6A(x) - n
31.6A(w) - n
31.6A(d) - n
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - y
31.6E(w) - y
31.6E(d) - y
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - y
36.1.1(x) - n
36.1.1(w) - n
36.1.1(d) - n
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - n
36.2.1(w) - n
36.2.1(d) - n
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - n
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET11"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - y	58 - u
46B(x) - n	48D(d) - n	50(w) - y	59.1 - u
46B(w) - n	48E(x) - n	50(d) - y	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

****

Summary of Evaluation Results for "WET8"

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	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	M	*
Sediment/Toxicant Retention	L	H	M
Nutrient Removal/Transformation	L	H	M
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	H	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - n
s22 - i
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - n
2.2.2 - y
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - y
8.2 - n
8.3 - y
8.4 - n
9.1 - n
9.2 - y
9.3 - i
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - y
11(w) - y
11(d) - y
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - y
12Da(w) - y
12Da(d) - y
12Db(x) - n
12Db(w) - n
12Db(d) - n
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - y
13A(w) - y
13A(d) - y
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - y
13Ae(w) - y
13Ae(d) - y
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - n
13D(w) - n
13D(d) - n
13Da(x) - n
13Da(w) - n
13Da(d) - n
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - n
15.1B - y
15.1C - n
15.2 - n
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET8"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - y
19.1A - i
19.1B - n
19.2 - n
19.3 - n
20.1 - y
20.2 - n
21A - y
21B - n
21C - n
21D - n
21E - n
22.1.1 - y
22.1.2 - y
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - i
25.2B - i
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - y
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - y
31.2(w) - y
31.2(d) - y
31.3(x) - y
31.3(w) - y
31.3(d) - y
31.4(x) - n
31.4(w) - n
31.4(d) - n
31.5(x) - y
31.5(w) - y
31.5(d) - y
31.6A(x) - n
31.6A(w) - n
31.6A(d) - n
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - y
31.6E(w) - y
31.6E(d) - y
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - y
36.1.1(x) - n
36.1.1(w) - n
36.1.1(d) - n
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - n
36.2.1(w) - n
36.2.1(d) - n
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - y
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET8"

45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - n	58 - u
46B(x) - n	48D(d) - n	50(w) - n	59.1 - u
46B(w) - n	48E(x) - n	50(d) - n	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

****

Summary of Evaluation Results for "WET100"

****

	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	L	L	*
Ground Water Discharge	L	L	*
Floodflow Alteration	L	H	M
Sediment Stabilization	L	M	*
Sediment/Toxicant Retention	L	H	M
Nutrient Removal/Transformation	L	H	M
Production Export	*	M	*
Wildlife Diversity/Abundance	L	*	*
Wildlife D/A Breeding	*	H	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abundance	L	L	*
Uniqueness/Heritage	L	*	*
Recreation	L	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

s1 - n
s2 - n
s3 - n
s4 - n
s5 - n
s6 - n
s7 - n
s8 - n
s9 - n
s10 - n
s11 - n
s12 - n
s13 - n
s14 - n
s15 - n
s16 - n
s17 - n
s18 - i
s19 - n
s20 - n
s21 - i
s22 - n
s23 - n
s24 - n
s25 - n
s26 - n
s27 - n
s28 - n
s29 - n
s30 - n
s31 - n
1.1 - n
1.2 - n
1.3 - y
2.1.1 - y
2.1.2 - n
2.1.3 - n
2.2.1 - n
2.2.2 - y
3.1 - y
3.2 - n
3.3 - n
4.1 - n
4.2A - y
4.2B - n
4.2C - n
4.2D - n
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - n
6.2 - n
7 - y
8.1 - y
8.2 - n
8.3 - y
8.4 - n
9.1 - n
9.2 - y
9.3 - i
10A - n
10B - y
10C - n
10D - n
10E - n
10F - n
11(x) - y
11(w) - y
11(d) - y
12A(x) - n
12A(w) - n
12A(d) - n
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - n
12Ae(w) - n
12Ae(d) - n
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - y
12D(w) - y
12D(d) - y
12Da(x) - y
12Da(w) - y
12Da(d) - y
12Db(x) - n
12Db(w) - n
12Db(d) - n
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - y
13A(w) - y
13A(d) - y
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - y
13Ab(w) - y
13Ab(d) - y
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - n
13Ae(w) - n
13Ae(d) - n
13B(x) - n
13B(w) - n
13B(d) - n
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - n
13Be(w) - n
13Be(d) - n
13C(x) - n
13C(w) - n
13C(d) - n
13Ca(x) - n
13Ca(w) - n
13Ca(d) - n
13Cb(x) - n
13Cb(w) - n
13Cb(d) - n
13Cc(x) - n
13Cc(w) - n
13Cc(d) - n
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - n
13D(w) - n
13D(d) - n
13Da(x) - n
13Da(w) - n
13Da(d) - n
13Db(x) - n
13Db(w) - n
13Db(d) - n
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - n
14.1(w) - n
14.1(d) - n
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - n
15.1B - y
15.1C - n
15.2 - n
16A(x) - y
16A(w) - y

WET Answer Dataset for "WET100"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - y
19.1A - i
19.1B - n
19.2 - n
19.3 - n
20.1 - y
20.2 - n
21A - y
21B - n
21C - n
21D - n
21E - n
22.1.1 - y
22.1.2 - y
22.2 - n
22.3 - n
23 - n
24.1 - i
24.2 - y
24.3 - i
24.4 - i
24.5 - n
25.1 - n
25.2A - i
25.2B - i
25.3 - n
26.1 - n
26.2 - i
26.3 - i
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - y
29.2 - n
30(x) - n
30(w) - n
30(d) - n
31.1(x) - y
31.1(w) - y
31.1(d) - y
31.2(x) - y
31.2(w) - y
31.2(d) - y
31.3(x) - y
31.3(w) - y
31.3(d) - y
31.4(x) - n
31.4(w) - n
31.4(d) - n
31.5(x) - y
31.5(w) - y
31.5(d) - y
31.6A(x) - n
31.6A(w) - n
31.6A(d) - n
31.6B(x) - n
31.6B(w) - n
31.6B(d) - n
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - y
31.6E(w) - y
31.6E(d) - y
32A - n
32B - n
32C - n
32D - n
32E - y
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - n
33B - n
33C - n
33D - n
33E - y
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - n
34.3.2 - i
35.1 - n
35.2 - y
36.1.1(x) - n
36.1.1(w) - n
36.1.1(d) - n
36.1.2(x) - n
36.1.2(w) - n
36.1.2(d) - n
36.2.1(x) - n
36.2.1(w) - n
36.2.1(d) - n
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - i
38.1 - n
38.2 - n
38.3 - n
38.4 - n
38.5 - n
38.6 - n
38.7 - n
38.8 - i
39 - y
40.1 - i
40.2 - i
41.1 - i
41.2 - i
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - n
42.2.1(w) - n
42.2.1(d) - n
42.2.2(x) - n
42.2.2(w) - n
42.2.2(d) - n
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - y
43A(w) - y
43A(d) - y
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - n
43E(w) - n
43E(d) - n
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - n
44A(w) - n
44A(d) - n
44B(x) - n
44B(w) - n
44B(d) - n
44C(x) - n
44C(w) - n
44C(d) - n
44D(x) - n
44D(w) - n
44D(d) - n
44E(x) - n
44E(w) - n
44E(d) - n
44F(x) - n
44F(w) - n
44F(d) - n
44G(x) - n
44G(w) - n
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "WET100"

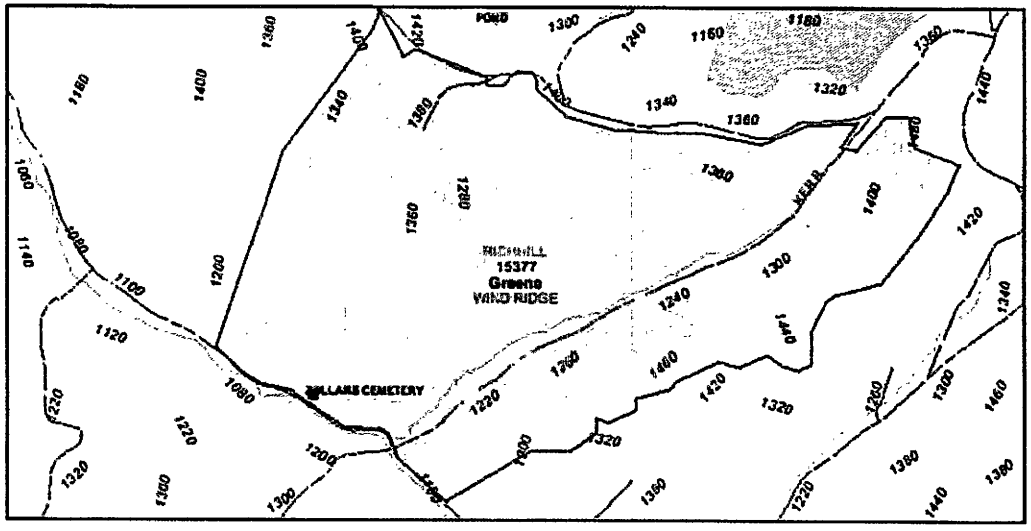
45D - n	48B(w) - n	49.2(x) - n	55.3 - u
45E - n	48B(d) - n	49.2(w) - n	55.4 - u
45F - n	48C(x) - n	49.2(d) - n	56.1 - u
45G - n	48C(w) - n	49.3(x) - n	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - n	57.1 - u
46A(w) - y	48D(x) - n	49.3(d) - n	57.2 - u
46A(d) - y	48D(w) - n	50(x) - n	58 - u
46B(x) - n	48D(d) - n	50(w) - n	59.1 - u
46B(w) - n	48E(x) - n	50(d) - n	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - n	53.2 - u	64 - u
47C - n	49.1.1(w) - n	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - n	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

APPENDIX C

PNDI CORRESPONDENCE

PNDI Project Environmental Review Receipt
Project Search ID: 20081110166538
Project Name: Bailey Coal Refuse Disposal Areas No. 5 and 6
Date: 11/10/2008 3:09:50 PM

Project Location



Project Name: Bailey Coal Refuse Disposal Areas No. 5 and 6
On Behalf Of: Self
Project Search ID: 20081110166538
Date: 11/10/2008 3:09:45 PM
# of Potential Impacts: 1
Jurisdictional Agency:
Pennsylvania Department of Conservation and Natural Resources
Project Category: Mining,Coal (strip, deep, long-wall, refuse disposal)
Project Location
Decimal Degrees: 39.95763 N, -80.42528 W
Degrees Minutes Seconds: 39° 57' 27.5" N, 80° 25' 31" W
Lambert: -676598.95306272, 356971.58504645 ft
ZIP Code: 15377
County: Greene
Township/Municipality: RICHHILL
USGS 7.5 Minute Quadrangle ID: 789
Quadrangle Name: WIND RIDGE
Project Area: 705.6 acres

Location Accuracy

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Receipt is solely responsible for the project location and thus the correctness of the Project Review Receipt content.

1 Potential Impacts

Under the Following Agencies' Jurisdiction: Pennsylvania Department of Conservation and Natural Resources

 APPLICANT INITIALS: MLS

Pennsylvania Natural Diversity Inventory (PNDI) records indicate there are potential impacts on special concern species and resources within the project area. If the project is pursued, the jurisdictional agency/agencies indicated require that the instructions below regarding potential impacts and/or avoidance measures be followed in their entirety.

These determinations were based on the project-specific information you provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the information you provided does not accurately reflect this project, or if project plans change, DEP and the jurisdictional agencies require that another PNDI review be conducted.

This response represents the most up-to-date summary of the PNDI data files and is good for one(1) year from the date of this PNDI Project Environmental Review Receipt.

1 potential impact
The Applicant should MAIL/FAX a copy of this Project Environmental Review Receipt, a cover letter with project narrative, acreage to be impacted, how construction/maintenance activity is to be accomplished, township/municipality and county where project is located, and a USGS 7.5 minute quadrangle with project boundary and quad name marked on the map.

Ecological Services Section
Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
P.O. Box 8552
Harrisburg, PA 17105-8552
FAX Number: (717) 772-0271

Based on the project-specific information you provided, no impacts to federally listed, proposed, or candidate species are anticipated. Therefore, no further consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required with the U.S. Fish and Wildlife Service. Because no take of federally listed species is anticipated, none is authorized. For a list of species that could occur in your project area (but have not been documented in PNDI), please see the county lists of threatened, endangered, and candidate species. A field visit or survey may reveal previously undocumented populations of one or more threatened or endangered species with a project area. If it is determined that any federally listed species occur in your project area, the U.S. Fish and Wildlife Service requires that you initiate consultation to identify and resolve any conflicts. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

DISCLAIMER

The PNDI environmental review website is a preliminary environmental screening tool. It is not a substitute for information obtained from a field survey of the project area conducted by a biologist. Such surveys may reveal previously undocumented populations of species of special concern. In addition, the PNDI only contains information about species occurrences that have actually been reported to the Pennsylvania Natural Heritage Program.

TERMS OF USE

Upon signing into the PNDI environmental review website, and as a condition of using it, you agreed to certain terms of use. These are as follows:

The web site is intended solely for the purpose of screening projects for potential impacts on resources of special concern in accordance with the instructions provided on the web site. Use of the web site for any other purpose or in any other way is prohibited and subject to criminal prosecution under federal and state law, including but not limited to the following:

 APPLICANT INITIALS: MLS

Computer Fraud and Abuse Act of 1986, as amended, 18 U.S.C. Â§ 1030; Pennsylvania Crimes Code, Â§ 4911 (tampering with public records or information), Â§ 7611 (unlawful use of computer and other computer crimes), Â§ 7612 (disruption of service), Â§ 7613 (computer theft), Â§ 7614 (unlawful duplication), and Â§ 7615 (computer trespass).

The PNHP reserves the right at any time and without notice to modify or suspend the web site and to terminate or restrict access to it.

The terms of use may be revised from time to time. By continuing to use the web site after changes to the terms have been posted, the user has agreed to accept such changes.

This review is based on the project information that was entered. The jurisdictional agencies and DEP require that the review be redone if the project area, location, or the type of project changes. If additional information on species of special concern becomes available, this review may be reconsidered by the jurisdictional agency.

PRIVACY and SECURITY

This web site operates on a Commonwealth of Pennsylvania computer system. It maintains a record of each environmental review search result as well as contact information for the project applicant. These records are maintained for internal tracking purposes. Information collected in this application will be made available only to the jurisdictional agencies and to the Department of Environmental Protection, except if required for law enforcement purposesâ€"see paragraph below.

This system is monitored to ensure proper operation, to verify the functioning of applicable security features, and for other like purposes. Anyone using this system consents to such monitoring and is advised that if such monitoring reveals evidence of possible criminal activity, system personnel may provide the evidence to law enforcement officials. See Terms of Use.

In order for this project to be considered for subsequent review, a signed and initialed copy of this receipt is required by the agency or agencies indicated. DEP requires that a signed and initialed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted in applications for permits requiring PNDI review. See DEP PNDI policy at www.naturalheritage.state.pa.us or visit the following websites for further information.

Regional Offices
Http://www.dep.state.pa.us/dep/deputate/fieldops/map.pdf

District Mining Operations
Http://www.dep.state.pa.us/dep/deputate/minres/Districts/homepage/Default.htm

Oil and Gas Management
Http://www.dep.state.pa.us/dep/deputate/minres/OILGAS/CustomerNeeds.htm

Print this Project Review Receipt using your Internet browser's print function and keep it as a record of your search.

Signature: Michael L. Shum

Date: 11-10-08

Project applicant on whose behalf this search was conducted:

APPLICANT

 APPLICANT INITIALS: MLS

PNDI Project Environmental Review Receipt

Project Search ID: 20081110166538
Project Name: Bailey Coal Refuse Disposal Areas No. 5 and 6
Date: 11/10/2008 3:09:50 PM

Contact Name: Consol Pennsylvania Coal Company LLC - Ed Suter FAX Number: (717) 772-0271

Address: 1525 Pleasant Grove Road

City, State, Zip: Claysville, PA 15323

Phone: 724-663-3034

Email: EdSuter@consolenergy.com

PERSON CONDUCTING SEARCH (if not applicant)

Contact Name: Civil & Environmental Consultants, Inc. - Michael Shema

Address: 333 Baldwin Road

City, State, Zip: Pittsburgh, PA 15205

Phone: 412-429-2324

Email: mshema@cec-inc.com

The following contact information is for the agencies involved in this Pennsylvania Natural Diversity Inventory environmental review process. Please read this entire receipt carefully as it contains instructions for how to contact these agencies for further review of this particular project.

Ecological Services Section
Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
P.O. Box 8552
Harrisburg, PA 17105-8552

 APPLICANT INITIALS: MLS

November 10, 2008

CERTIFIED MAIL 7007 1490 0003 3567 2130

Ms. Rebecca Bowen
Ecological Services Section
Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
P.O. Box 8552
Harrisburg, PA 17105-8552

Dear Ms. Bowen:

Subject: Bailey Coal Refuse Disposal Areas 5 and 6
Project Search ID: 20081110166538
Consol Pennsylvania Coal Company LLC
Richhill Township, Greene County, Pennsylvania
CEC Project 071-522.0005

Civil & Environmental Consultants, Inc. (CEC) is writing in regard to an online PNDI Project Environmental Review (Search ID: 20081110166538) performed for the proposed development activities at Bailey Mine Complex located in Richhill Township, Greene County, Pennsylvania. The PNDI search identified one potential impact under the jurisdiction of the DCNR (see attached PNDI receipt) at the proposed site.

The site encompasses approximately 706 acres as identified on the attached portion of the USGS 7.5 minute topographic quadrangle map of Wind Ridge, PA. The proposed construction activities are located along two unnamed tributaries to Owens Run and include the following four phases:

1. Phase I - Construction of an Overland Conveyor Belt;
2. Phase II - Construction of a Sediment Pond;
3. Phase III - Construction of a Slurry Impoundment; and
4. Phase IV - Construction of a Coarse Refuse Disposal Area.

CEC conducted botanical surveys for the entire project area in July 2007 to identify rare plants and rare plant habitats using repetitive pedestrian transects. The principle species of concern, as identified by DCNR, were passion flower (*Passiflora lutea*) and Nuttall's hedge nettle (*Stachys nuttalli*). However, CEC biologists also considered other species and their potential habitat that are known to occur in the area, including: wild senna (*Senna marilandica*), white trout lily (*Erythronium albidum*), harbinger of spring (*Erigenia bulbosa*), great Indian plantain (*Cacalia*

Pittsburgh 333 Baldwin Road
Pittsburgh, Pennsylvania 15205
Phone 412/429-2324
Fax 412/429-2114
Toll Free 800/365-2324
E-mail info@cecinc.com

Chicago 877/963-6026
Cincinnati 800/759-5614
Cleveland 866/507-2324
Columbus 888/598-6808
Detroit 866/380-2324
Export 800/899-3610
Indianapolis 877/746-0749
Nashville 800/763-2326
St. Louis 866/250-3679

Corporate Web Site http://www.cecinc.com

muhlenbergii), Curtis's goldenrod (*Solidago curtissii*), netted chain fern (*Lorinseria areolata*), and large flowered leaf cup (*Polymnia uvedalia*).

The botanical surveys did not identify any populations of rare plants within the project area. Additionally, habitats capable of supporting rare plants were very limited within the project area. Based on the results of this survey, it is CEC's opinion that no potential impacts to plant species of special concern will occur due to the proposed activities. CEC will provide DCNR with a full report detailing the methods, results, and conclusions of the survey.

CEC requests that DCNR consider the previous discussion of the surveys when responding to this request for additional information on the species of special concern that triggered the potential impact on the PNDI Project Environmental Review (Search ID: 20081110166538).

Please contact me if you have any questions. Thank you for your assistance.

Very truly yours,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Joseph A. Isaac

Joseph A. Isaac
Project Manager

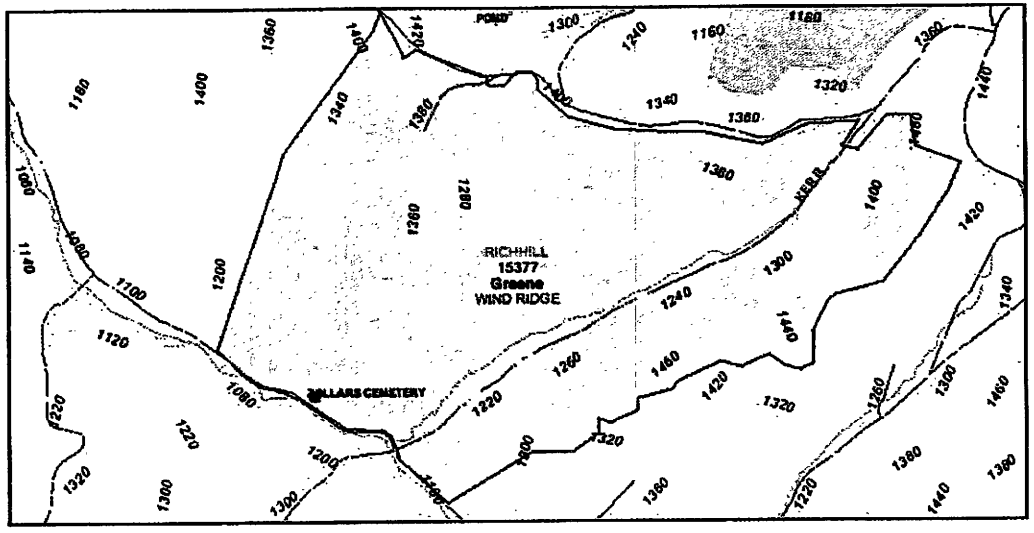
Enclosures

cc: Ed Suter – Consol
Kerry Kampfer – Consol

L-071-522.0005.N10/W

PNDI Project Environmental Review Receipt
Project Search ID: 20081110166538
Project Name: Bailey Coal Refuse Disposal Areas No. 5 and 6
Date: 11/10/2008 3:09:50 PM

Project Location



Location Accuracy

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Receipt is solely responsible for the project location and thus the correctness of the Project Review Receipt content.

1 Potential Impacts

Under the Following Agencies' Jurisdiction: Pennsylvania Department of Conservation and Natural Resources

Project Name: Bailey Coal Refuse Disposal Areas No. 5 and 6
On Behalf Of: Self
Project Search ID: 20081110166538
Date: 11/10/2008 3:09:45 PM
# of Potential Impacts: 1
Jurisdictional Agency:
Pennsylvania Department of Conservation and Natural Resources
Project Category: Mining,Coal (strip, deep, long-wall, refuse disposal)
Project Location
Decimal Degrees: 39.95763 N, -80.42528 W
Degrees Minutes Seconds: 39° 57' 27.5" N, 80° 25' 31" W
Lambert: -676598.95306272, 356971.58504645 ft
ZIP Code: 15377
County: Greene
Township/Municipality: RICHHILL
USGS 7.5 Minute Quadrangle ID: 789
Quadrangle Name: WIND RIDGE
Project Area: 705.6 acres

 APPLICANT INITIALS: MLS

Pennsylvania Natural Diversity Inventory (PNDI) records indicate there are potential impacts on special concern species and resources within the project area. If the project is pursued, the jurisdictional agency/agencies indicated require that the instructions below regarding potential impacts and/or avoidance measures be followed in their entirety.

These determinations were based on the project-specific information you provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the information you provided does not accurately reflect this project, or if project plans change, DEP and the jurisdictional agencies require that another PNDI review be conducted.

This response represents the most up-to-date summary of the PNDI data files and is good for one(1) year from the date of this PNDI Project Environmental Review Receipt.

1 potential impact
The Applicant should MAIL/FAX a copy of this Project Environmental Review Receipt, a cover letter with project narrative, acreage to be impacted, how construction/maintenance activity is to be accomplished, township/municipality and county where project is located, and a USGS 7.5 minute quadrangle with project boundary and quad name marked on the map.

Ecological Services Section
Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
P.O. Box 8552
Harrisburg, PA 17105-8552
FAX Number: (717) 772-0271

Based on the project-specific information you provided, no impacts to federally listed, proposed, or candidate species are anticipated. Therefore, no further consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required with the U.S. Fish and Wildlife Service. Because no take of federally listed species is anticipated, none is authorized. For a list of species that could occur in your project area (but have not been documented in PNDI), please see the county lists of threatened, endangered, and candidate species. A field visit or survey may reveal previously undocumented populations of one or more threatened or endangered species with a project area. If it is determined that any federally listed species occur in your project area, the U.S. Fish and Wildlife Service requires that you initiate consultation to identify and resolve any conflicts. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

DISCLAIMER

The PNDI environmental review website is a preliminary environmental screening tool. It is not a substitute for information obtained from a field survey of the project area conducted by a biologist. Such surveys may reveal previously undocumented populations of species of special concern. In addition, the PNDI only contains information about species occurrences that have actually been reported to the Pennsylvania Natural Heritage Program.

TERMS OF USE

Upon signing into the PNDI environmental review website, and as a condition of using it, you agreed to certain terms of use. These are as follows:

The web site is intended solely for the purpose of screening projects for potential impacts on resources of special concern in accordance with the instructions provided on the web site. Use of the web site for any other purpose or in any other way is prohibited and subject to criminal prosecution under federal and state law, including but not limited to the following:

 APPLICANT INITIALS: MLS

Computer Fraud and Abuse Act of 1986, as amended, 18 U.S.C. Â§ 1030; Pennsylvania Crimes Code, Â§ 4911 (tampering with public records or information), Â§ 7611 (unlawful use of computer and other computer crimes), Â§ 7612 (disruption of service), Â§ 7613 (computer theft), Â§ 7614 (unlawful duplication), and Â§ 7615 (computer trespass).

The PNHP reserves the right at any time and without notice to modify or suspend the web site and to terminate or restrict access to it.

The terms of use may be revised from time to time. By continuing to use the web site after changes to the terms have been posted, the user has agreed to accept such changes.

This review is based on the project information that was entered. The jurisdictional agencies and DEP require that the review be redone if the project area, location, or the type of project changes. If additional information on species of special concern becomes available, this review may be reconsidered by the jurisdictional agency.

PRIVACY and SECURITY

This web site operates on a Commonwealth of Pennsylvania computer system. It maintains a record of each environmental review search result as well as contact information for the project applicant. These records are maintained for internal tracking purposes. Information collected in this application will be made available only to the jurisdictional agencies and to the Department of Environmental Protection, except if required for law enforcement purposesâ€"see paragraph below.

This system is monitored to ensure proper operation, to verify the functioning of applicable security features, and for other like purposes. Anyone using this system consents to such monitoring and is advised that if such monitoring reveals evidence of possible criminal activity, system personnel may provide the evidence to law enforcement officials. See Terms of Use.

In order for this project to be considered for subsequent review, a signed and initialed copy of this receipt is required by the agency or agencies indicated. DEP requires that a signed and initialed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted in applications for permits requiring PNDI review. See DEP PNDI policy at www.naturalheritage.state.pa.us or visit the following websites for further information.

Regional Offices
Http://www.dep.state.pa.us/dep/deputate/fieldops/map.pdf

District Mining Operations
Http://www.dep.state.pa.us/dep/deputate/minres/Districts/homepage/Default.htm

Oil and Gas Management
Http://www.dep.state.pa.us/dep/deputate/minres/OILGAS/CustomerNeeds.htm

Print this Project Review Receipt using your Internet browser's print function and keep it as a record of your search.

Signature: Michael L. Shaw

Date: 11-10-08

Project applicant on whose behalf this search was conducted:

APPLICANT

 APPLICANT INITIALS: MLS

PNDI Project Environmental Review Receipt

Project Search ID: 20081110166538
Project Name: Bailey Coal Refuse Disposal Areas No. 5 and 6
Date: 11/10/2008 3:09:50 PM

Contact Name: Consol Pennsylvania Coal Company LLC - Ed Suter

FAX Number: (717) 772-0271

Address: 1525 Pleasant Grove Road

City, State, Zip: Claysville, PA 15323

Phone: 724-663-3034

Email: EdSuter@Consolenergy.com

PERSON CONDUCTING SEARCH (if not applicant)

Contact Name: Civil & Environmental Consultants, Inc. - Michael Shema

Address: 333 Baldwin Road

City, State, Zip: Pittsburgh, PA 15205

Phone: 412-429-2324

Email: mshema@cecinc.com

The following contact information is for the agencies involved in this Pennsylvania Natural Diversity Inventory environmental review process. Please read this entire receipt carefully as it contains instructions for how to contact these agencies for further review of this particular project.

Ecological Services Section
Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
P.O. Box 8552
Harrisburg, PA 17105-8552

 APPLICANT INITIALS: MLS

USGS 7.5 Minute Topographic Map
Wind Ridge, PA Quadrangle
Dated: 1964,
Photorevised 1994.

DWN BY: GLC
CHK BY: MLS

1 inch equals 2,000 feet

DATE: 11/10/2008

0 1,000 2,000 3,000 4,000 Feet

Legend

Project Boundary (706 Acres)

ISSUED FOR: CONSOLENERGY

ISSUED BY:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
333 Baldwin Road
Pittsburgh, PA 15205-9702
1-800-365-2324
Columbus, OH * Cincinnati, OH * Indianapolis, IN * Nashville, TN * Chicago, IL * St. Louis, MO * Export, PA * Detroit, MI

USGS SITE LOCATION MAP
BAILEY COAL REFUSE DISPOSAL AREAS NO. 5 AND 6
CONSOL PENNSYLVANIA COAL COMPANY LLC
GREENE COUNTY, PENNSYLVANIA

PROJECT NO.: 071-522.0005

FIGURE: 1

J:\Projects\2007\071522\maps\final\071522_usgs_site_location_11_10_08.mxd 11/10/2008 @ 2:09:05 PM

7007 1490 0003 3567 2130

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$ 1.17
Certified Fee	2.70
Return Receipt Fee (Endorsement Required)	2.20
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 6.07

11/10/08
J Isaac
071-522.0005
Postmark Here

Sent To ~~MS REBECCA BOWEN~~
PA DEPT CONSERVATION & NATURAL RESOURCES
Street, Apt. No., or PO Box No. BUREAU OF FORESTRY
City, State, ZIP+4 P O BOX 8552
HARRISBURG PA 17105-8552

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

MS REBECCA BOWEN
ECOLOGICAL SERVICES SECTION
PA DEPARTMENT OF CONSERVATION AND
NATURAL RESOURCES
BUREAU OF FORESTRY
P O BOX 8552
HARRISBURG PA 17105-8552

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Deborah Murphy ☐ Agent ☒ Addressee

B. Received by (Printed Name) NOV 12 2008 C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for ~~Merchandise~~
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7007 1490 0003 3567 2130

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

APPENDIX D

STREAM AND WETLAND RESTORATION AREA PHOTOGRAPHS

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 1

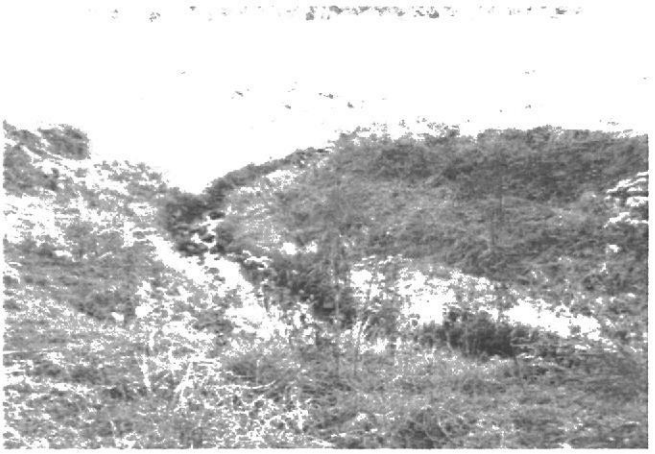
Photograph 1: Restoration Area 1
Templeton Fork - Reach 1

Photograph 2: Restoration Area 1
Templeton Fork - Reach 2

Photograph 3: Restoration Area 1
Templeton Fork - Reach 2

Photograph 4: Restoration Area 1
Templeton Fork - Reach 3

Photograph 5: Restoration Area 1
Templeton Fork - Reach 4



Photograph 6: Restoration Area 1
Templeton Fork - Reach 4

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 1

Photograph 7: Restoration Area 1
Templeton Fork - Reach 5

Photograph 8: Restoration Area 1
Templeton Fork - Reach 5

Photograph 9: Restoration Area 1
Templeton Fork - Reach 5

Photograph 10: Restoration Area 1
Templeton Fork - Reach 5

Photograph 11: Restoration Area 1
Templeton Fork - Reach 5

Photograph 12: Restoration Area 1
Templeton Fork - Reach 6

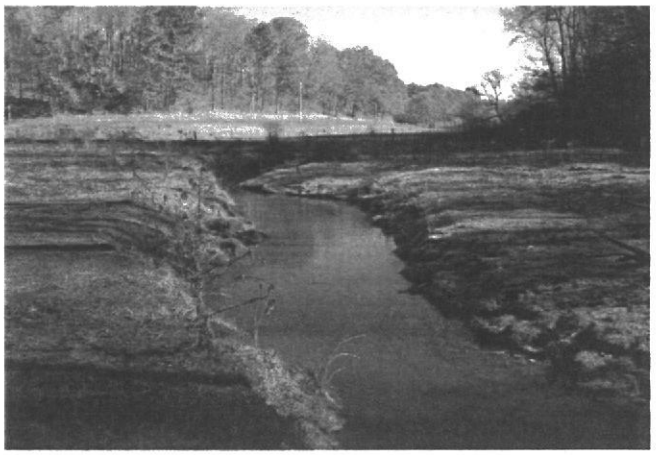
STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 1

Photograph 13: Restoration Area 1
Templeton Fork - Reach 7

Photograph 14: Restoration Area 1
Templeton Fork - Reach 8

Photograph 15: Restoration Area 1
Templeton Fork - Reach 9

Photograph 16: Restoration Area 1
Templeton Fork - Reach 10



Photograph 17: Restoration Area 1
Templeton Fork - Reach 11

Photograph 18: Restoration Area 1
Templeton Fork - Reach 11

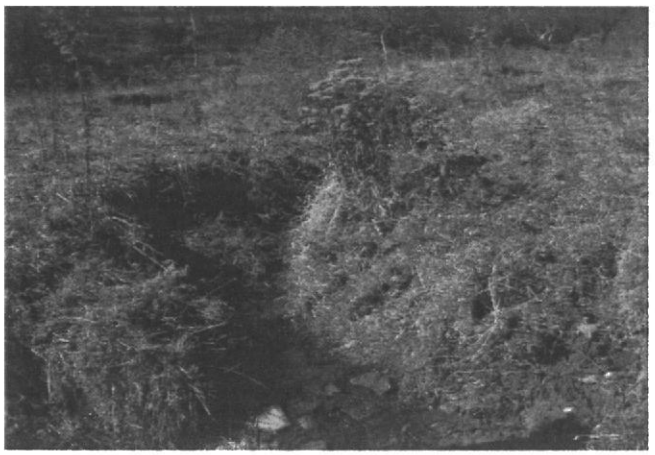
STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 1

Photograph 19: Restoration Area 1
UNT-1 to Templeton Fork - Reach 1

Photograph 20: Restoration Area 1
UNT-1 to Templeton Fork - Reach 1

Photograph 21: Restoration Area 1
UNT-1 to Templeton Fork - Reach 2

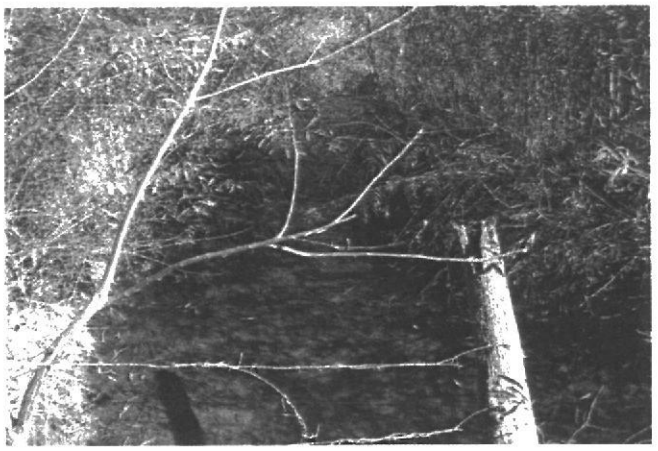
Photograph 22: Restoration Area 1
UNT-1 to Templeton Fork - Stable Stream Reach



Photograph 23: Restoration Area 1
32738 to Templeton Fork - Reach 1

Photograph 24: Restoration Area 1
32738 to Templeton Fork - Reach 2

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 1



Photograph 25: Restoration Area 1
32738 to Templeton Fork - Reach 3

Photograph 26: Restoration Area 1
32738 to Templeton Fork - Reach 4

Photograph 27: Restoration Area 1
32738 to Templeton Fork - Reach 5

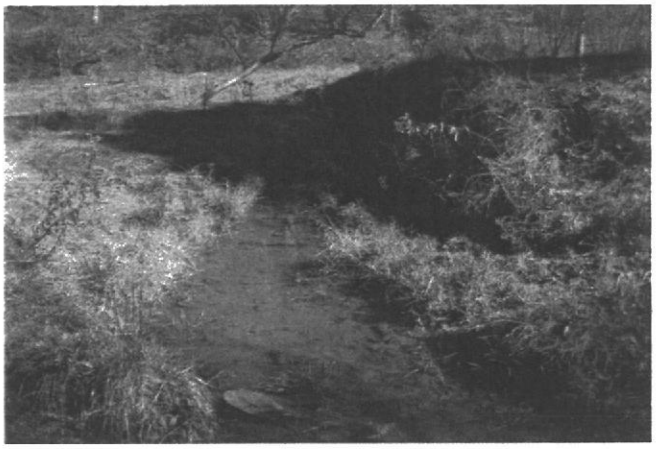
Photograph 28: Restoration Area 1
32738 to Templeton Fork - Reach 6

Photograph 29: Restoration Area 1
32738 to Templeton Fork - Reach 7

Photograph 30: Restoration Area 1
32738 to Templeton Fork - Reach 8

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 1

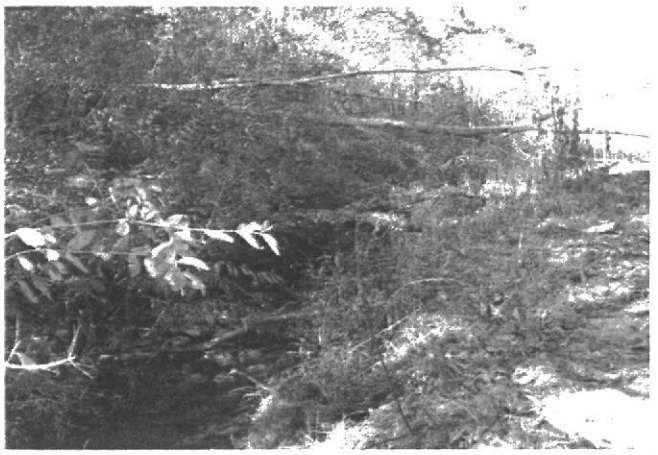
Photograph 31: Restoration Area 1
32738 to Templeton Fork - Reach 9



Photograph 32: Restoration Area 1
32738 to Templeton Fork - Reach 10

Photograph 33: Restoration Area 1
32738 to Templeton Fork - Reach 11

Photograph 34: Restoration Area 1
32738 to Templeton Fork - Reach 12



Photograph 35: Restoration Area 1
32738 to Templeton Fork - Reach 13

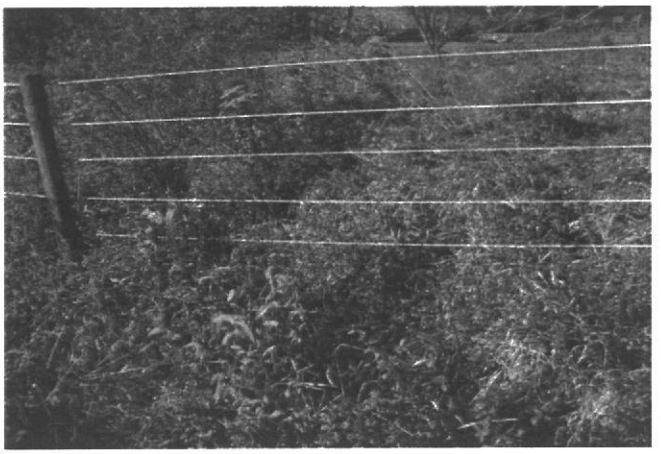
Photograph 36: Restoration Area 1
32738 to Templeton Fork - Reach 13

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 1

Photograph 37: Restoration Area 1
32738 to Templeton Fork - Reach 14

Photograph 38: Restoration Area 1
32738 to Templeton Fork - Reach 15

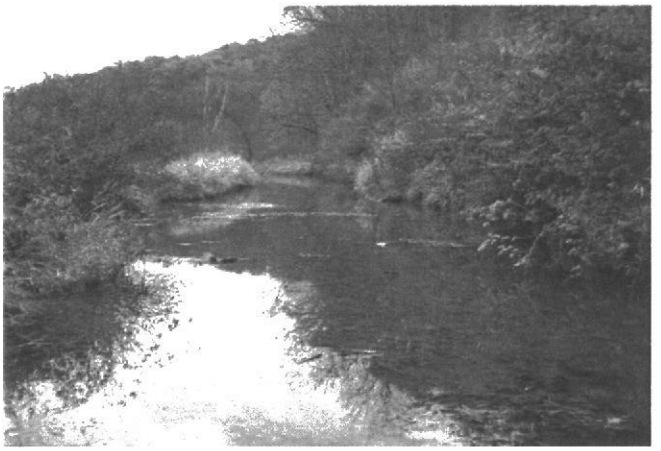
Photograph 39: Restoration Area 1
32738 to Templeton Fork - Reach 16



Photograph 40: Restoration Area 1
32738 to Templeton Fork - Reach 16

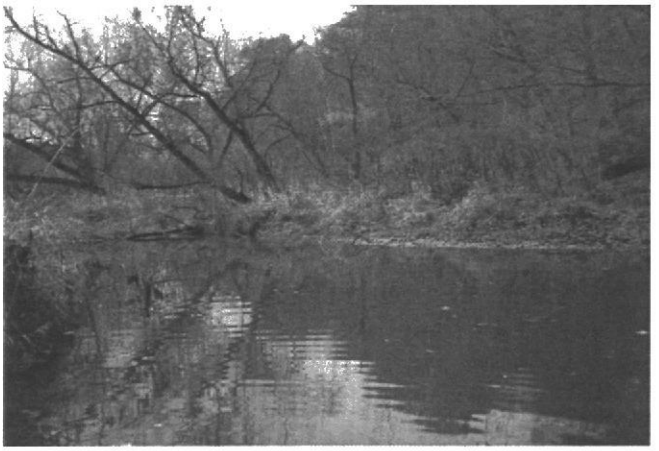
STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 2

Photograph 1: Restoration Area 2
Templeton Fork - Reach 1



Photograph 2: Restoration Area 2
Templeton Fork - Reach 2

Photograph 3: Restoration Area 2
Templeton Fork - Reach 3



Photograph 4: Restoration Area 2
Templeton Fork - Reach 4

Photograph 5: Restoration Area 2
Templeton Fork - Reach 5

Photograph 6: Restoration Area 2
Templeton Fork - Reach 6

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 2

Photograph 7: Restoration Area 2
Templeton Fork - Reach 7

Photograph 8: Restoration Area 2
Templeton Fork - Reach 8

Photograph 9: Restoration Area 2
32731 to Templeton Fork - Reach 1

Photograph 10: Restoration Area 2
32731 to Templeton Fork - Reach 2

Photograph 11: Restoration Area 2
32731 to Templeton Fork - Reach 3

Photograph 12: Restoration Area 2
32731 to Templeton Fork - Reach 4

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 2

Photograph 13: Restoration Area 2
32731 to Templeton Fork - Reach 5

Photograph 14: Restoration Area 2
32731 to Templeton Fork - Reach 6

Photograph 15: Restoration Area 2
32731 to Templeton Fork - Reach 7

Photograph 16: Restoration Area 2
32731 to Templeton Fork - Reach 8

Photograph 17: Restoration Area 2
32731 to Templeton Fork - Reach 9

Photograph 18: Restoration Area 2
32731 to Templeton Fork - Reach 10

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 2

Photograph 19: Restoration Area 2
32731 to Templeton Fork - Reach 11

Photograph 20: Restoration Area 2
32732 to Templeton Fork - Reach 1

Photograph 21: Restoration Area 2
32732 to Templeton Fork - Reach 2

Photograph 22: Restoration Area 2
32732 to Templeton Fork - Reach 3

Photograph 23: Restoration Area 2
32732 to Templeton Fork - Reach 4

Photograph 24: Restoration Area 2
32732 to Templeton Fork - Reach 5

STREAM RESTORATION PHOTOGRAPHS
TEMPLETON FORK STREAM RESTORATION - AREA 2

Photograph 25: Restoration Area 2
32732 to Templeton Fork - Reach 6

Photograph 26: Restoration Area 2
32732 to Templeton Fork - Reach 7

Photograph 27: Restoration Area 2
32732 to Templeton Fork - Reach 8

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 3

Photograph 1: Restoration Area 3
Rocky Run - Reach 1

Photograph 2: Restoration Area 3
Rocky Run - Reach 2

Photograph 3: Restoration Area 3
Rocky Run - Reach 3

Photograph 4: Restoration Area 3
Rocky Run - Reach 4

Photograph 5: Restoration Area 3
Rocky Run - Reach 5

Photograph 6: Restoration Area 3
Rocky Run - Reach 6

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 3

Photograph 7: Restoration Area 3
Rocky Run - Reach 7

Photograph 8: Restoration Area 3
Rocky Run - Reach 8

Photograph 9: Restoration Area 3
Rocky Run - Reach 9

Photograph 10: Restoration Area 3
Rocky Run - Reach 10

Photograph 11: Restoration Area 3
Rocky Run - Reach 11

Photograph 12: Restoration Area 3
Rocky Run - Reach 12

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 3

Photograph 13: Restoration Area 3
Rocky Run - Reach 13

Photograph 14: Restoration Area 3
Rocky Run - Reach 14

Photograph 15: Restoration Area 3
Rocky Run - Reach 15

Photograph 16: Restoration Area 3
Rocky Run - Reach 16

Photograph 17: Restoration Area 3
Rocky Run - Reach 17

Photograph 18: Restoration Area 3
Rocky Run - Reach 18

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 3

Photograph 19: Restoration Area 3
Rocky Run - Reach 19

Photograph 20: Restoration Area 3
Rocky Run - Reach 20

Photograph 21: Restoration Area 3
Rocky Run - Reach 21

Photograph 22: Restoration Area 3
Rocky Run - Reach 22

Photograph 23: Restoration Area 3
Rocky Run - Reach 23

Photograph 24: Restoration Area 3
Rocky Run - Reach 24

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 3

Photograph 25: Restoration Area 3
Rocky Run - Reach 25

Photograph 26: Restoration Area 3
Rocky Run - Reach 26

Photograph 27: Restoration Area 3
Rocky Run - Reach 27

Photograph 28: Restoration Area 3
Tributary 32723 to Rocky Run - Reach 1

Photograph 29: Restoration Area 3
Tributary 32724 to Rocky Run - Reach 1

Photograph 30: Restoration Area 3
Tributary 32724 to Rocky Run - Reach 2

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 3

Photograph 31: Restoration Area 3
Tributary 32724 to Rocky Run - Reach 3

Photograph 32: Restoration Area 3
Tributary 32724 to Rocky Run - Reach 4

Photograph 33: Restoration Area 3
UNT-1 to Rocky Run - Reach 1

Photograph 34: Restoration Area 3
UNT-2 to Rocky Run - Reach 1

Photograph 35: Restoration Area 3
UNT-3 to Rocky Run - Reach 1

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 4

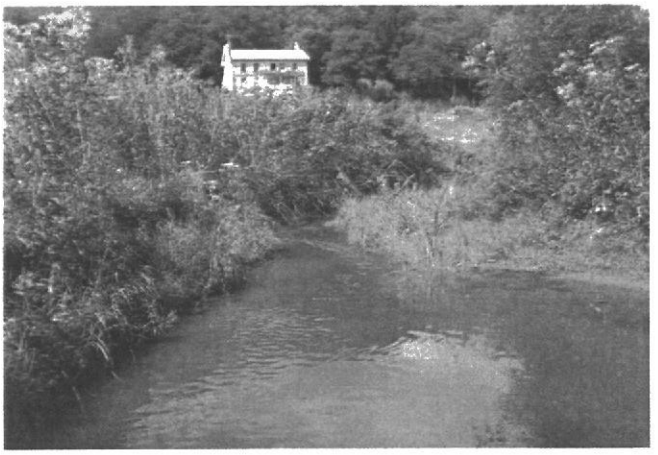
Photograph 1: Restoration Area 4
Rocky Run - Reach 1

Photograph 2: Restoration Area 4
Rocky Run - Reach 2

Photograph 3: Restoration Area 4
Rocky Run - Reach 3

Photograph 4: Restoration Area 4
Rocky Run - Reach 4

Photograph 5: Restoration Area 4
Rocky Run - Reach 5



Photograph 6: Restoration Area 4
Rocky Run - Reach 6

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 4

Photograph 7: Restoration Area 4
Rocky Run - Reach 7

Photograph 8: Restoration Area 4
Rocky Run - Reach 8

Photograph 9: Restoration Area 4
Rocky Run - Reach 9

Photograph 10: Restoration Area 4
Rocky Run - Reach 10

Photograph 11: Restoration Area 4
Rocky Run - Reach 11

Photograph 12: Restoration Area 4
Rocky Run - Reach 12

STREAM RESTORATION PHOTOGRAPHS
ROCKY RUN STREAM RESTORATION - AREA 4

Photograph 13: Restoration Area 4
Rocky Run - Reach 13

Photograph 14: Restoration Area 4
Rocky Run - Reach 14

Photograph 15: Restoration Area 4
Rocky Run - Reach 15

Photograph 16: Restoration Area 4
Rocky Run - Reach 16

Photograph 17: Restoration Area 4
Rocky Run - Reach 17

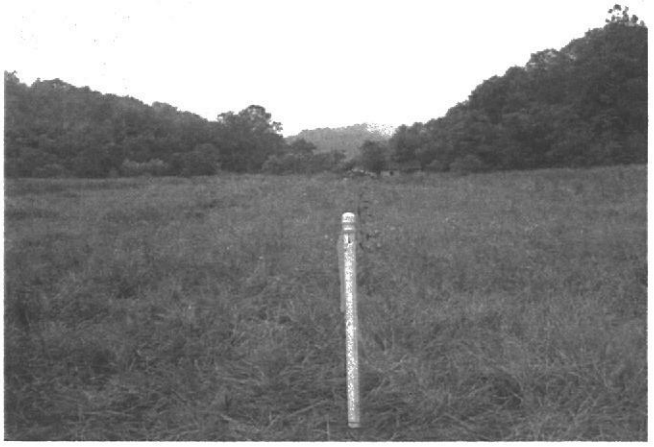
WETLAND MITIGATION PHOTOGRAPHS
CRABAPPLE CREEK MITIGATION AREA

Photograph 1: Crabapple Creek Floodplain
View: South (08-26-08)

Photograph 2: Crabapple Creek Floodplain
View: Southwest (08-26-08)

Photograph 3: Crabapple Creek Floodplain
View: West (08-26-08)

Photograph 4: Crabapple Creek Floodplain
View: East (08-16-05)



Photograph 5: Crabapple Creek Floodplain
View: East (08-16-05)

Photograph 6: Crabapple Creek Floodplain
View: East (08-16-05)

APPENDIX E

WETLAND DETERMINATION DATA FORMS AND PHOTOGRAPHS

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	October 23, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J.Hoffman **Photographs:** 23	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland A
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** TS-1

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Nasturtium officinale*	H	OBL	6			
2	*Glyceria sp.*	H	OBL	7			
3	*Juncus effusus*	H	FACW+	8			
4	*Lemna minor*	H	OBL	9			
5	*Eupatorium perfoliatum*	H	FACW+	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100 % (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)
____ Stream, Lake, or Tide Gauge
____ Aerial Photographs
X No Recorded Data Available

Field Observations:

Depth of Surface Water: 1-2 (inches)

Depth to Free Water in Pit: >16 (inches)

Depth to Saturated Soil: to surface (inches)

Wetland Hydrology Indicators:

Primary Indicators:
X Inundated (Partial 1-2")
X Saturated in upper 12 inches
____ Water Marks
____ Drift Lines
____ Sediment Deposits
____ Drainage Patterns in Wetlands

Secondary Indicators:
____ Oxidized Root Channels in Upper 12 Inches
____ Water Stained Leaves
____ Local Soil Survey Data
____ FAC-Neutral Test
____ Others (Explain in Remarks)

Remarks:

Primary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland A -TS 1

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup) Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-3		2.5Y3/3	None	N/A	Silt Loam
3-10		2.5Y2.5/1	5Y4/1	Common/Coarse	Sand Loam
10-16		5Y3/2	None	N/A	Alluvium

Hydric Soil Indicators:

_____	Histosol	_____	Concretions
_____	Histic Epipedon	_____	High Organic Content in Surface Layer in Sandy Soils
_____	Sulfidic Odor	_____	Organic Streaking in Sandy Soil
_____	Aquic Moisture Regimes	_____	Listed on Local Hydric Soils List
_____	Reducing Conditions	_____	Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors	_____	Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No _____		Is this Sampling Point Within a Wetland?
Wetland Hydrology Present?	Yes X	No _____		Yes X
Hydric Soils Present?	Yes X	No _____		No _____
				USFWS: PEM

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	October 23, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Hoffman **Photographs:** 42	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland B
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** TS-2

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Glyceria sp.*	H	OBL	6			
2	*Lysimachia nummularia*	H	OBL	7			
3	*Agrimonia paruiflora*	H	FAC	8			
4	*Impatiens sp*	H	FACW	9			
5	*Juncus effusus*	H	FACW+	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100 % (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	X Inundated (partial, 2-3")
X No Recorded Data Available	X Saturated in upper 12 inches
Field Observations:	____ Water Marks
	____ Drift Lines
Depth of Surface Water: 2-3 (inches)	____ Sediment Deposits
	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 8 (inches)	Secondary Indicators:
	____ Oxidized Root Channels in Upper 12 Inches
Depth to Saturated Soil: to surface (inches)	X Water Stained Leaves
	____ Local Soil Survey Data
	____ FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied .

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland B -TS 2

SOILS

Map Unit Name:
(Series and Phase): Fluvaquents, loamy (Fa)
(Taxonomy Subgroup) N/A

Drainage Class: Somewhat poorly/poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-2		10YR4/2	None	N/A	Clay Silt
2-16		5Y3/1	None	N/A	Clay Silt

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No		Is this Sampling Point Within a Wetland?
Wetland Hydrology Present?	Yes X	No		Yes X
Hydric Soils Present?	Yes X	No		No
				USFWS: PEM

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	October 28, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 24	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland C
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** TS-3

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Typha angustifolia*	H	OBL	6			
2	*Leersia oryzoides*	H	OBL	7			
3	*Phalaris arundinacea*	H	FACW+	8			
4	*Eupatorium perfoliatum*	H	FACW+	9			
5	*Aster puniceus*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100 % (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)
____ Stream, Lake, or Tide Gauge
____ Aerial Photographs
X No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (inches)

Depth to Free Water in Pit: 7 (inches)

Depth to Saturated Soil: to surface (inches)

Wetland Hydrology Indicators:

Primary Indicators:
____ Inundated
X Saturated in upper 12 inches
____ Water Marks
____ Drift Lines
____ Sediment Deposits
____ Drainage Patterns in Wetlands

Secondary Indicators:
____ Oxidized Root Channels in Upper 12 Inches
____ Water Stained Leaves
____ Local Soil Survey Data
____ FAC-Neutral Test
____ Others (Explain in Remarks)

Remarks:

A primary indicator of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland C -TS 3

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup) Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0 - 3		10YR 4/2	None	N/A	Silt Loam
3 - 11		2.5YR 4/2	5YR 3/3	Common/Medium	Silt Loam
11 - 16		10YR 5/6	2.5YR 4/2	Many/Medium	Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No
USFWS: PEM

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	October 28, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 25	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland D
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** TS-4

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Phalaris arundinacea*	H	FACW+	6			
2	*Polygonum sagittatum*	H	OBL	7			
3	*Epilobium coloratum*	H	OBL	8			
4	*Polygonum hydropiper*	H	OBL	9			
5				10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100 % (4 / 4)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	____ Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: >16 (inches)	Secondary Indicators:
Depth to Saturated Soil: >16 (inches)	X Oxidized Root Channels in Upper 12 Inches
	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland D -TS 4

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup) Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0 - 4		10YR 4/2	None	N/A	Silt Loam
4 - 16		10YR 4/2	5YR 4/4	Common/Medium	Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No		Is this Sampling Point Within a Wetland?
Wetland Hydrology Present?	Yes X	No		Yes X
Hydric Soils Present?	Yes X	No		No
				USFWS: PEM

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	October 28, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 26	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland E
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** TS-5

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Phalaris arundinacea*	H	FACW+	6			
2	*Glyceria sp.*	H	OBL	7			
3	*Epilobium coloratum*	H	OBL	8			
4	*Carex lurida*	H	OBL	9			
5	*Aster puniceus*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100 % (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	X Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	X Drainage Patterns in Wetlands
Depth to Free Water in Pit: 11 (inches)	Secondary Indicators:
	____ Oxidized Root Channels in Upper 12 Inches
Depth to Saturated Soil: to surface (inches)	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland E -TS 5

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup) Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0 - 4		10YR 4/2	None	N/A	Silt Loam
4 - 16		5Y 4/2	7.5YR 3/3	Few/Fine	Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No
USFWS: PEM

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	October 28, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 27	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland F
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** TS-6

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Poa sp.*	H	N.I.	6			
2	*Carex frankii*	H	OBL	7			
3	*Polygonum sp.*	H	N.I.	8			
4	*Eupatorium perfoliatum*	H	FACW+	9			
5	*Leersia virginica*	H	FACW	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100 % (3 / 3)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	____ Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	X Drainage Patterns in Wetlands
Depth to Free Water in Pit: >16 (inches)	Secondary Indicators:
	____ Oxidized Root Channels in Upper 12 Inches
Depth to Saturated Soil: >16 (inches)	____ Water Stained Leaves
	____ Local Soil Survey Data
	____ FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

A primary indicator of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland F -TS 6

SOILS

Map Unit Name:
(Series and Phase): Fluvaquents, loamy (Fa)
(Taxonomy Subgroup) N/A

Drainage Class: Somewhat poorly/poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0 - 3		10YR 3/2	None	N/A	Silt Loam
3 - 16		5Y 4/1	7.5YR 5/8	Common/Fine to Medium	Clayey Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No		Is this Sampling Point Within a Wetland?
Wetland Hydrology Present?	Yes X	No		Yes X
Hydric Soils Present?	Yes X	No		No
				USFWS: PEM

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	October 28, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 41	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland G
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** TS-7

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Acorus calamus*	H	OBL	6			
2	*Carex lurida*	H	OBL	7			
3	*Polygonum sagittatum*	H	OBL	8			
4	*Aster puniceus*	H	OBL	9			
5	*Juncus effusus*	H	FACW+	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100 % (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

	Recorded Data (Describe in Remarks)
	Stream, Lake, or Tide Gauge
	Aerial Photographs
X	No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (inches)

Depth to Free Water in Pit: 11 (inches)

Depth to Saturated Soil: to surface (inches)

Wetland Hydrology Indicators:

Primary Indicators:

	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
X	Drainage Patterns in Wetlands

Secondary Indicators:

X	Oxidized Root Channels in Upper 12 Inches
	Water Stained Leaves
	Local Soil Survey Data
X	FAC-Neutral Test
	Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland G -TS 7

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup) Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0 - 6		10YR 4/2	7.5YR 3/3	Common/Fine	Silt Loam
6 - 16		2.5Y 4/1	2.5YR 2.5/4	Many/Coarse	Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No
USFWS: PEM

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	October 28, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 42	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland H
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** TS-8

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Aster prenanthoides*	H	FAC	6			
2	*Agrimonia parviflora*	H	FAC	7			
3	*Alliaria petiolata*	H	FACU-	8			
4	*Panicum clandestinum*	H	FAC+	9			
5	*Ranunculus sp.*	H	N.I.	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 75 % (3 / 4)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	____ Saturated in upper 12 inches
Field Observations:	____ Water Marks
	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	X Drainage Patterns in Wetlands
Depth to Free Water in Pit: >16 (inches)	Secondary Indicators:
	X Oxidized Root Channels in Upper 12 Inches
Depth to Saturated Soil: >16 (inches)	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland H -TS 8

SOILS

Map Unit Name:
(Series and Phase): Fluvaquents, loamy (Fa)
(Taxonomy Subgroup) N/A

Drainage Class: Somewhat poorly/poorly drained
Field Observations Confirm Mapped Type?
Yes ____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0 - 10		10YR 3/2	None	N/A	Silt Loam
10 - 16		2.5Y 4/1	5YR 4/4	Coarse/Many	Sandy Silt Loam

Hydric Soil Indicators:

____	Histosol	____	Concretions
____	Histic Epipedon	____	High Organic Content in Surface Layer in Sandy Soils
____	Sulfidic Odor	____	Organic Streaking in Sandy Soil
____	Aquic Moisture Regimes	____	Listed on Local Hydric Soils List
____	Reducing Conditions	____	Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors	____	Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No ____		Is this Sampling Point Within a Wetland?
Wetland Hydrology Present?	Yes X	No ____		Yes X
Hydric Soils Present?	Yes X	No ____		No
				USFWS: PEM

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 6, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 32	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland I
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area?	Yes	No X	**Plot ID:** Test Site 9
(if needed, explain on reverse.)			

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Ranunculus repens*	H	FAC	6			
2	*Glyceria striata*	H	OBL	7			
3	*Scirpus polyphyllus*	H	OBL	8			
4	*Carex sp.*	H	-	9			
5	*Epilobium coloratum*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 60% (3 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

	Recorded Data (Describe in Remarks)
	Stream, Lake, or Tide Gauge
	Aerial Photographs
X	No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (inches)

Depth to Free Water in Pit: >16 (inches)

Depth to Saturated Soil: to surface (inches)

Wetland Hydrology Indicators:

Primary Indicators:

	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators:

	Oxidized Root Channels in Upper 12 Inches
	Water Stained Leaves
	Local Soil Survey Data
X	FAC-Neutral Test
	Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland I -Test Site 9

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes ____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-2		10YR3/3	None	N/A	Silt Loam
2-16		10YR3/1	None	N/A	Sandy Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No ____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 6, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 33	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland J
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 10

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Leersia oryzoides*	H	OBL	6			
2	*Polygonum sagittatum*	H	OBL	7			
3	*Typha angustifolia*	H	OBL	8			
4	*Ranunculus repens*	H	FAC	9			
5	*Impatiens sp.*	H	FACW	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 80% (4 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	X Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 16 (inches)	Secondary Indicators:
	____ Oxidized Root Channels in Upper 12 Inches
Depth to Saturated Soil: to surface (inches)	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland J -Test Site 10

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes ____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-3		10YR3/2	None	N/A	Silt Loam
3-16		10YR3/1	None	N/A	Sandy Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No		Is this Sampling Point Within a Wetland?
Wetland Hydrology Present?	Yes X	No		Yes X
Hydric Soils Present?	Yes X	No		No

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 6, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 34	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland K
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 11

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Carex vulpinoidea*	H	OBL	6			
2	*Leersia oryzoides*	H	OBL	7			
3	*Carex frankii*	H	OBL	8			
4	*Juncus effusus*	H	FACW+	9			
5	*Epilobium coloratum*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100% (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	X Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: >16 (inches)	Secondary Indicators:
	X Oxidized Root Channels in Upper 12 Inches
Depth to Saturated Soil: to surface (inches)	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland K -Test Site 11

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-2		10YR4/2	None	N/A	Silt Loam
2-16		10YR4/1	2.5YR2.5/4	Few/Coarse	Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No _____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 6, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 45	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland L
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 12

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Carex vulpinoidea*	H	OBL	6			
2	*Juncus effusus*	H	FACW+	7			
3	*Polygonum sp.*	H	-	8			
4	*Epilobium coloratum*	H	OBL	9			
5	*Eleocharis acicularis*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 80% (4 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	X Inundated
X No Recorded Data Available	X Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: <0.5 (inches)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 12 (inches)	Secondary Indicators:
Depth to Saturated Soil: to surface (inches)	____ Oxidized Root Channels in Upper 12 Inches
	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland L -Test Site 12

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents
Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-16		10YR3/1	None	N/A	Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No _____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 6, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 46	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland M
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area?	Yes	No X	**Plot ID:** Test Site 13
(if needed, explain on reverse.)			

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Carex sp.*	H	-	6			
2	*Mentha spicata*	H	FACW+	7			
3	*Leersia oryzoides*	H	OBL	8			
4	*Acorus calamus*	H	OBL	9			
5	*Juncus effusus*	H	FACW+	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 80% (4 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

	Recorded Data (Describe in Remarks)
	Stream, Lake, or Tide Gauge
	Aerial Photographs
X	No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (inches)

Depth to Free Water in Pit: >16 (inches)

Depth to Saturated Soil: to surface (inches)

Wetland Hydrology Indicators:

Primary Indicators:

	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators:

X	Oxidized Root Channels in Upper 12 Inches
	Water Stained Leaves
	Local Soil Survey Data
X	FAC-Neutral Test
	Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland M -Test Site 13

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes ____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-2		10YR4/1	None	N/A	Silt Loam
2-10		10YR3/1	None	N/A	Silt Loam
10-16		10YR3/1	5YR4/4	Common/Coarse	Sandy Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No ____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 6, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 47	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland N
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 14

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Juncus effusus*	H	FACW+	6			
2	*Carex vulpinoidea*	H	OBL	7			
3	*Carex lurida*	H	OBL	8			
4	*Acorus calamus*	H	OBL	9			
5	*Leersia oryzoides*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100% (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

	Recorded Data (Describe in Remarks)
	Stream, Lake, or Tide Gauge
	Aerial Photographs
X	No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (inches)

Depth to Free Water in Pit: 15 (inches)

Depth to Saturated Soil: to surface (inches)

Wetland Hydrology Indicators:

Primary Indicators:

	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators:

X	Oxidized Root Channels in Upper 12 Inches
	Water Stained Leaves
	Local Soil Survey Data
X	FAC-Neutral Test
	Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland N -Test Site 14

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-3		10YR4/2	2.5YR3/4	Common/Coarse	Silt Loam
3-16		10YR3/1	None	N/A	Sandy Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No _____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 7, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 74	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland V
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 22

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Phalaris arundinacea*	H	FACW+	6	*Mimulus ringens*	H	OBL
2	*Typha angustifolia*	H	OBL	7	*Epilobium coloratum*	H	OBL
3	*Leersia oryzoides*	H	OBL	8			
4	*Juncus effusus*	H	FACW+	9			
5	*Carex frankii*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100% (7 / 7)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	X Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: >16 (inches)	Secondary Indicators:
	____ Oxidized Root Channels in Upper 12 Inches
Depth to Saturated Soil: to surface (inches)	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland V -Test Site 22

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes ____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-4		10YR4/2	None	N/A	Silt Loam
4-16		10YR4/1	10YR5/6	Few/Fine	Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No ____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 7, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	M. Shema, J. Dietzen **Photographs:** 75	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland W
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 23

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Phalaris arundinacea*	H	FACW+	6			
2	*Juncus effusus*	H	FACW+	7			
3	*Asclepias incarnata*	H	OBL	8			
4	*Acorus calamus*	H	OBL	9			
5	*Scirpus validus*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100% (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	X Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: >16 (inches)	Secondary Indicators:
Depth to Saturated Soil: to surface (inches)	X Oxidized Root Channels in Upper 12 Inches
	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland W -Test Site 23

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes ____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-8		10YR4/2	None	N/A	Silt Loam
8-16		10YR4/1	10YR4/6	Common/Fine	Silt Loam

Hydric Soil Indicators:

____	Histosol	____	Concretions
____	Histic Epipedon	____	High Organic Content in Surface Layer in Sandy Soils
____	Sulfidic Odor	____	Organic Streaking in Sandy Soil
____	Aquic Moisture Regimes	____	Listed on Local Hydric Soils List
____	Reducing Conditions	____	Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors	____	Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No ____	Is this Sampling Point Within a Wetland?
Wetland Hydrology Present?	Yes X	No ____	Yes X
Hydric Soils Present?	Yes X	No ____	No ____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 7, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	**Photographs:** 76	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland X
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 24

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Phalaris arundinacea*	H	FACW+	6			
2	*Carex lurida*	H	OBL	7			
3	*Scirpus validus*	H	OBL	8			
4	*Juncus effusus*	H	FACW+	9			
5	*Mimulus ringens*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 100% (5 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

	Recorded Data (Describe in Remarks)
	Stream, Lake, or Tide Gauge
	Aerial Photographs
X	No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (inches)

Depth to Free Water in Pit: >16 (inches)

Depth to Saturated Soil: to surface (inches)

Wetland Hydrology Indicators:

Primary Indicators:

	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators:

X	Oxidized Root Channels in Upper 12 Inches
	Water Stained Leaves
	Local Soil Survey Data
X	FAC-Neutral Test
	Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland X -Test Site 24

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents
Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-6		10YR4/2	5YR4/6	Common/Coarse	Sandy Silt Loam
6 - refusal		-	-	-	-

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No _____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 7, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	**Photographs:** 77	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland Y
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 25

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Ranunculus repens*	H	FAC	6			
2	*Carex sp.*	H	-	7			
3	*Impatiens sp.*	H	FACW	8			
4	*Onoclea sensibilis*	H	FACW	9			
5	*Acorus calamus*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 60% (3 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

____ Recorded Data (Describe in Remarks)	**Wetland Hydrology Indicators:**
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
X No Recorded Data Available	____ Saturated in upper 12 inches
	____ Water Marks
Field Observations:	____ Drift Lines
	____ Sediment Deposits
Depth of Surface Water: N/A (inches)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: >16 (inches)	Secondary Indicators:
	X Oxidized Root Channels in Upper 12 Inches
Depth to Saturated Soil: >16 (inches)	____ Water Stained Leaves
	____ Local Soil Survey Data
	X FAC-Neutral Test
	____ Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland Y -Test Site 25

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents
Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-2		10YR4/2	None	N/A	Silt Loam
2-16		5Y3/1	7.5YR4/6	Common/Coarse	Silty Clay loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No _____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetland Delineation Manual)

Project/Site:	071-522.0010 CRDA Mitigation Site Selection	**Date:**	November 7, 2008
Applicant/Owner:	Consol Pennsylvania Coal Company LLC	**County:**	Washington
Investigator(s):	**Photographs:** 78	**State:**	PA

Do normal circumstances exist on the site?	Yes X	No	**Community ID:** Wetland Z
Is the site significantly disturbed (Atypical?)	Yes	No X	
Is the area a potential problem area? (if needed, explain on reverse.)	Yes	No X	**Plot ID:** Test Site 26

VEGETATION

	Dominant Plant Species:	Stratum:	Indicator:		Dominant Plant Species:	Stratum:	Indicator:
1	*Phalaris arundinacea*	H	FACW+	6			
2	*Ranunculus repens*	H	FAC	7			
3	*Juncus effusus*	H	FACW+	8			
4	*Carex frankii*	H	OBL	9			
5	*Epilobium coloratum*	H	OBL	10			

Percent of dominant species that are OBL, FACW or FAC (and excluding FAC-) = 80% (4 / 5)

Remarks:

Greater than 50% of the dominant plant species are hydrophytes; therefore the hydrophytic vegetation criterion is satisfied.

HYDROLOGY

	Recorded Data (Describe in Remarks)
	Stream, Lake, or Tide Gauge
	Aerial Photographs
X	No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (inches)

Depth to Free Water in Pit: >16 (inches)

Depth to Saturated Soil: to surface (inches)

Wetland Hydrology Indicators:

Primary Indicators:

	Inundated
X	Saturated in upper 12 inches
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators:

X	Oxidized Root Channels in Upper 12 Inches
	Water Stained Leaves
	Local Soil Survey Data
X	FAC-Neutral Test
	Others (Explain in Remarks)

Remarks:

Primary and secondary indicators of wetland hydrology were observed; therefore, the wetland hydrology criterion is satisfied

Project/Site: 071-522.0010 CRDA Mitigation Site Selection
Site/Area ID: Wetland Z -Test Site 26

SOILS

Map Unit Name:
(Series and Phase): Newark silt loam, (Nw)
(Taxonomy Subgroup): Aeric fluvaquents

Drainage Class: Somewhat poorly drained
Field Observations Confirm Mapped Type?
Yes _____ No X

Profile Description:

Depth (inches):	Horizon:	Matrix Color (Munsell Moist):	Mottle Colors (Munsell Moist):	Mottle (Abundance/Size):	Texture, Concretions, Structure:
0-1		10YR4/2	7.5YR4/6	Many/Fine	Silt Loam
1-7		10YR4/1	7.5YR4/6	Many/Coarse	Silt Loam
7-16		10YR3/1	5YR3/4	Many/Large	Sandy Silt Loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soil
	Aquic Moisture Regimes		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low Chroma Colors		Other (Explain in Remarks)

Remarks:

Soils exhibited low-chroma matrix colors with high chroma mottles in the upper portion of the B-horizon; therefore, the hydric soils criterion is satisfied

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	
Hydric Soils Present?	Yes X	No	

Is this Sampling Point Within a Wetland?
Yes X
No _____

Remarks:

This test site was determined to be within a wetland due to the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

EXISTING WETLANDS WITHIN STREAM RESTORATION AREAS
BAILEY CRDA NO. 5 & 6

Photograph 1: Wetland A
Restoration Area 1, along Templeton Fork

Photograph 2: Wetland B
Restoration Area 1, along Tributary 32738

Photograph 3: Wetland C
Restoration Area 2, along Templeton Fork

Photograph 4: Wetland D
Restoration Area 2, along Templeton Fork

Photograph 5: Wetland E
Restoration Area 2, along Templeton Fork

Photograph 6: Wetland F
Restoration Area 2, along Tributary 32732

EXISTING WETLANDS WITHIN STREAM RESTORATION AREAS
BAILEY CRDA NO. 5 & 6

Photograph 7: Wetland G
Restoration Area 2, along Tributary 32731

Photograph 8: Wetland H
Restoration Area 2, along Tributary 32731

Photograph 9: Wetland I
Restoration Area 3, along Rocky Run

Photograph 10: Wetland J
Restoration Area 3, along Rocky Run

Photograph 11: Wetland K
Restoration Area 3, along Rocky Run

Photograph 12: Wetland L
Restoration Area 3, along Rocky Run

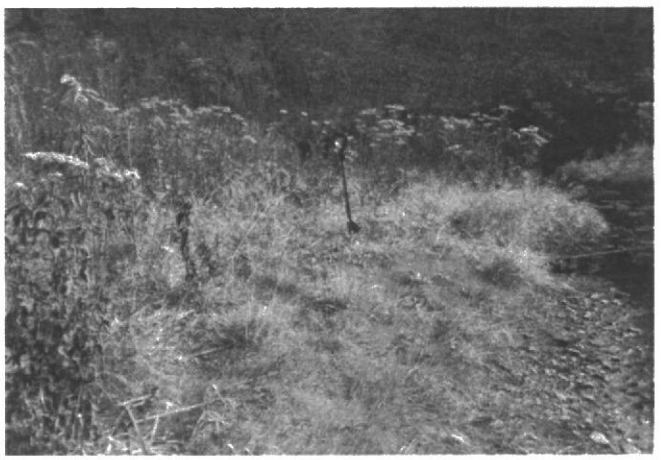
EXISTING WETLANDS WITHIN STREAM RESTORATION AREAS
BAILEY CRDA NO. 5 & 6

Photograph 13: Wetland M
Restoration Area 3, along Rocky Run

Photograph 14: Wetland N
Restoration Area 3, along Rocky Run

Photograph 15: Wetland V
Restoration Area 4, along Rocky Run

Photograph 16: Wetland W
Restoration Area 4, along Rocky Run



Photograph 17: Wetland X
Restoration Area 4, along Rocky Run

Photograph 18: Wetland Y
Restoration Area 4, along Rocky Run

EXISTING WETLANDS WITHIN STREAM RESTORATION AREAS
BAILEY CRDA NO. 5 & 6

Photograph 19: Wetland Z
Restoration Area 4, along Rocky Run

APPENDIX F

PHMC SUMMARY AND CORRESPONDENCE

APPENDIX F
PHMC CORRESPONDENCE SUMMARY

Cultural resource correspondence with the Pennsylvania Historical and Museum Commission (PHMC) was initiated for Phase I and Phase II of the proposed Bailey CRDA No. 5 & 6 project. The attached letter, dated June 20, 2008, from the PHMC states that, "Based on a recent field visit on June 18, 2008, by Mark McConaughy of our staff, it has been determined that the above referenced permit area [Phase I] has low archaeological potential. Consequently, this project should have no effect upon significant archaeological resources".

The PHMC issued a letter (attached) on October 7, 2008, in regard to Phase II, that concluded, "...potentially significant historic sites are located in or near your project area and others are likely to exist. These resources could be adversely affected by project activities." The letter also requires a Phase I archaeological survey. Christine Davis Consultants, Inc. has conducted the requisite Phase I archaeological survey and will prepare and submit a report to PHMC detailing the results of that survey. The PHMC response will be forwarded to the USACE upon receipt.

CPCC is working with Christine Davis Consultants, Inc. to submit requests for review of Phases III and IV. Correspondence related to these additional phases of the project will be forwarded to the USACE.

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

June 20, 2008

Gregory A. Heilman, PE
Michael Baker Jr., Inc.
Airside Business Park
100 Airside Drive
Moon, PA 15108

Re: File No. ER 1985-0390-059-A64
COALD: Consol Pennsylvania Coal Company LLC, Revision to Coal Refuse Disposal Permit No. 30810703, Bailey Coal Refuse Disposal Areas No. 1 & No. 2 Conveyor Corridor Extension, Rich Hill Twp., Greene Co.

Dear Mr. Heilman:

The Bureau for Historic Preservation has reviewed the above named project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988), and in accordance with relevant Federal legislation. This legislation includes Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, the Surface Mining Control and Reclamation Act, and OSM's regulations. This review includes comments on the project's potential effect on both historic and archaeological resources.

Based on a recent field visit on June 18, 2008, by Mark McConaughy of our staff, it has been determined that the above referenced permit area has low archaeological potential. Consequently, this project should have no effect upon significant archaeological resources. Should you become aware, from any source, that historic or archaeological properties are located at or near the project site, please contact the Bureau for Historic Preservation.

If you need further information in this matter please consult Kira Presler at (717) 705-0700. If you need further information regarding archaeological survey please contact Mark McConaughy at (724) 527-5585 x103.

Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

Cc: Mr. Edward Suter, Consol Pennsylvania Coal Company, LLC,
1525 Pleasant Grove Road, P.O. Box J, Claysville, PA 15323
DEP California District Mining Office
David Hamilton, OSM Harrisburg Office
Mark A. McConaughy

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

October 7, 2008

Gregory Heilman, PE
Michael Baker Jr., Inc.
Airside Business Park
100 Airside Drive
Moon, PA 15108

TO ENTER REVIEW USE
BHP REFERENCE NUMBER

Re: File No. ER 2002-1693-059-M
COE New Coal Refuse Disposal Area Permit: Bailey Coal Refuse Disposal Area No. 5-Sediment Pond Development, Richhill Twp., Greene Co.

Dear Mr. Heilman:

The Bureau for Historic Preservation has reviewed the above named project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988), and in accordance with relevant Federal legislation. This legislation includes Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, the Surface Mining Control and Reclamation Act, and OSM's regulations. This review includes comments on the project's potential effect on both historic and archaeological resources.

As a result of a recent field visit on October 3, 2008, by Mark McConaughy of our staff, it has been established that potentially significant historic sites are located in or near your project area and others are likely to exist. These resources could be adversely affected by project activities. A Phase IA archaeological survey is required to verify the extent of the 19th Century Farmstead that will be destroyed by the project and determine its eligibility for listing in the National Register of Historic Places. Also, the Zollar (or Sollar) cemetery needs to be documented since it could potentially be indirectly impacted by the project. Guidelines and instructions for conducting Phase I surveys are available on our web site at http://www.phmc.state.pa.us/bhp/Inventories/ArchaeologyGuidelines.pdf or from our office upon request. The historic sites in the area are listed below.

Existing 19th century farmstead.
Zollar Cemetery (19th century)

At this time, we recommend that the permit be denied and we request a conference to discuss the effects to archaeological resources within the permit area. We also recommend that, if the Phase IA survey is not undertaken, that the permit be conditioned to require that archaeological investigations be conducted if sites are discovered after the mining permit is issued. We also request that you provide us with written justification for your decision if you elect not to conduct the Phase IA survey.

If you need further information in this matter please consult Kira Presler at (717) 705-0700. If you need further information regarding archaeological survey please contact Mark McConaughy at (724) 527-5585 x103.

Sincerely,

(for)

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

Cc: Mr. Edward Suter, Consol Pennsylvania Coal Company, LLC
1525 Pleasant Grove Road, PO Box J, Claysville, PA 15323
DEP California District Office
David Hamilton, OSM Harrisburg Office
COE Pittsburgh Office
Mark A. McConaughy