

March 8, 2007

Mr. Mike Lee  
Natural Resources Section  
Tennessee Department of Environment  
and Conservation  
7th Floor L&C Annex  
401 Church Street  
Nashville, Tennessee 37243

Dear Mr. Lee:

TENNESSEE VALLEY AUTHORITY (TVA) - KINGSTON FOSSIL PLANT (KIF) - FLUE GAS  
DESULFURIZATION (FGD) DISPOSAL PROJECT - TENNESSEE AQUATIC RESOURCE  
ALTERATION AND CORPS OF ENGINEERS (COE) - APPLICATION FOR PERMIT FOR  
ALTERATION OF WETLAND AREAS IN PROPOSED GYPSUM DISPOSAL AREA

#### INTRODUCTION

TVA is in the process of constructing an FGD system to control sulfur dioxide (SO<sub>2</sub>) air emissions from the KIF fossil plant to meet requirements under the 1990 Clean Air Act Amendments and the Title IV regulations for the Acid Rain Program. By reducing SO<sub>2</sub> emissions, overall air quality will be improved. Synthetic gypsum will be produced by the reaction of SO<sub>2</sub> with limestone and oxygen in the scrubber absorber. The installation of the FGD system at KIF will necessitate additional disposal facilities for this coal combustion byproduct.

TVA plans to market as much of this synthetic gypsum as possible. In fact, an on-site processing/marketing facility is planned for processing 100% of the synthetic gypsum produced at KIF. Synthetic gypsum such as the material produced at KIF is used for wallboard and cement manufacturing and agricultural amendments. The success of synthetic gypsum marketing at KIF could be affected if gypsum quantity or quality is not as high as expected. Demand for KIF's synthetic gypsum could also become an issue in the future as more scrubbers are coming on line in the US and the supply of synthetic gypsum increases. For this reason, adequate disposal facilities for this material must be developed in the event that all of KIF's gypsum cannot be marketed.

An application has been submitted to Tennessee's Division of Solid Waste Management for the development of a disposal facility on a peninsula on the KIF reservation. The planned development of this disposal facility will be in two phases; however, the solid waste application has been made for the entire development. During Phase I, there will be impacts to two wetland areas (identified in enclosures as W3 and W4). Phase II will affect wetland areas W1, W1A, and W2. Phase I was sized to have sufficient capacity to allow time for the construction of the entire development if marketing fails. Due to the need to permit the entire site from a solid waste standpoint, TVA believes an appropriate approach for the 404 and Aquatic Resource Alteration Permit for wetlands alteration is to assume that these aquatic resources will be impacted at some time and proceed with permitting all impacts now.

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#### **APPLICATION INFORMATION**

Enclosed is an application packet which consists of a Corps of Engineers application form, a site map indicating affected areas, a detail map of the toe of slope of the FGD disposal area, a sketch of the proposed final elevations of the FGD facility, the wetlands delineation forms for wetland areas on the peninsula, a check for \$1000.00 to cover processing, and a proposal for compensatory mitigation.

#### **Alternative Disposal Locations Considered**

TVA examined several alternative disposal facility locations during the environmental assessment conducted for this project in addition to the proposed location on the KIF peninsula. For a prospective disposal site to be feasible from a solid waste permitting and construction standpoint, it must provide a minimum capacity for 5 years of operation if it is located at the plant site, or 20 years of operational capacity if it is located offsite. Both onsite and offsite disposal alternatives were considered and are summarized below:

- Berkshire Farm/Friche Farm - This offsite area consists of two separate farms of approximately 157 acres each and is located upstream of KIF, on the opposite bank of the Emory River. Although this disposal area would provide ample capacity, approximately 30 years per farm, the site was rejected due to cost and logistics of transmission line relocation and gypsum transportation and the requirement of a drying system for disposal. There were also floodplain and topography issues with the site.
- Tip of KIF Peninsula - This onsite area consists of approximately 28 acres southeast of the Kingston Wildlife Management Area and Refuge. A transmission line divides the area rendering a portion of the area unusable for disposal. This disposal alternative was rejected because it failed to meet the minimum required 5-year capacity.
- KIF Rail Loop - This onsite area consists of approximately 40 acres and is located west of the KIF powerhouse. A 12 acre area of this disposal alternative is diverse wetlands of high quality. This disposal alternative was rejected because it failed to meet the minimum required 5-year capacity and its impacts to high quality wetlands.
- Abandoned Ash Pond Chemical Pond Area - This onsite 37-acre area encompasses recreational fields and the active chemical treatment ponds. This disposal alternative was rejected because it failed to meet the minimum required 5-year capacity. In addition, the chemical ponds' disposal capacity would have to be replaced and there would have been an impact to availability for local recreation.
- Coal Pile - This onsite 13-acre area is located northwest of the KIF powerhouse. This disposal alternative was rejected because it failed to meet the minimum required 5-year capacity.
- Trailer Court - This offsite 7-acre area is located across the road from the KIF coal pile area. This disposal alternative was rejected because it failed to meet the minimum required 5-year capacity and it would have impacted non-TVA property owners.

- TVA Clinch River Breeder Reactor Site (CRBR) - This offsite area meets the required 20-year capacity and is located 25 miles from KIF. However, there are significant geological and archeological/cultural resource issues at this site. Although this disposal area would provide ample capacity this site was rejected due to cost and logistics of long distance gypsum transportation, the requirement of a drying system for disposal, geological concerns, and the potential impacts to cultural resources.
- Active KIF Ash Pond - This onsite disposal alternative would consist of the gypsum being co-located in the existing ash pond. Disposal in the facility's ash pond presents operational problems since gypsum, fly ash, and bottom ash all have different properties and handling could therefore be complex. It would also eliminate the ability to market gypsum due to the need for a continual gypsum supply for dredge cell construction. Additionally, the capacity of the existing ash pond is not unlimited and future additional disposal capacity for all combustion byproducts would have to be developed at a later date, probably only postponing the need for development of coal combustion byproduct disposal areas on the KIF peninsula. This alternative site was rejected due to the possible operational problems, the elimination of the gypsum material available to market and the future need for additional disposal areas.

#### **Avoided On-site Impacts and other Mitigating Factors**

TVA utilized both their routine delineation form and a rapid assessment methodology (RAM) similar to the Ohio RAM. Initial evaluation of the proposed gypsum disposal site on the KIF peninsula resulted in a delineation of approximately 5.85 acres of wetlands that could possibly be impacted. Subsequent modifications in the design of the proposed footprint of the gypsum disposal facility have avoided impacts to approximately 1.04 acres, reducing the impact to approximately 4.81 acres. In addition, impacts to higher quality wetlands in the KIF rail loop area described below were avoided.

During the preliminary site visit conducted with you, TVA, and the COE in October, we found that the areas being impacted by the gypsum disposal area had fairly extensive coverage by invasive species and other features that indicated that the impacted areas were of only low to moderate wetlands quality. The impacts to wildlife habitat by the construction of the FGD disposal area were also thought to be minimal, as the open water feature would be replaced in the vicinity by the ponded area of the gypsum disposal site.

TVA is also proposing compensatory mitigation to be performed by an outside contractor. We are providing a copy of the mitigation proposal developed by MRW Properties. This proposal contains detail on enhancing 19.5 acres, which is sufficient capacity to mitigate all 4.81 acres on a 4:1 ratio. However, during the site visit in October, Division personnel suggested that the impacted areas actually may be less than the total acreage that TVA delineated due to the presence of significant open water and invasive species in the delineated footprint. The estimated acreage of the largest open water feature is 1.35 acres. Enclosed is an overlay of the feature shown as a shaded magenta area on a topographic map; an aerial map is also included which shows a significant amount of open water in the area described as AS3/W3. We would be interested in learning the final determination by the Division of the actual areas necessary to be mitigated for this project.

#### **Additional Information**

The development of the FGD disposal site would occur on an area managed by the Tennessee Wildlife Resources Agency (TWRA) that allows for limited hunting for waterfowl, deer, and dove. This refuge was established for interim use with the intent of converting the use of the property

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Threatened and endangered species records indicate that there are several federally- or state-listed plant and animal species in the vicinity of KIF. However, during site field inspections of the proposed action area, it was determined that no federally- or state-listed species are present on the impacted lands or that impacts were unlikely to occur to listed species. Based on review of the TVA database, no sensitive aquatic animal species are known to occur in waters surrounding the project. A mussel survey conducted in October 2005 also failed to identify any sensitive species.

During construction, best management practices would be employed to minimize aquatic resources (including adjacent wetlands not being filled) as required under Tennessee's General Permit for Discharges Associated with Construction Activities, coverage number TNR190588.

Flood storage would not be significantly impacted by the gypsum landfill development on the KIF peninsula according to the Environmental Assessment completed for the FGD at KIF. It was determined that the loss was minimized under the TVA Flood Control Storage Loss Guidelines.

TVA is mandated under the National Historic Preservation Act and the Archaeological Resources Protection Act to protect significant archaeological resources and historic properties that may be affected by TVA actions. The State Historic Preservation Officer determined that there are no eligible archeological or historic sites within the project's footprint.

TVA looks forward to an expeditious issuance of the ARAP and COE permits. For purposes of meeting public notice requirements, please forward the required information for newspaper publishing and posting at the site to the following address.

Ben O'Brien  
TVA Kingston Fossil Plant  
714 Swan Pond Road  
Harriman, Tennessee 37748

Email: [wbobrien@tva.gov](mailto:wbobrien@tva.gov)

TVA believes it would expedite the permitting process to request a public hearing on this matter so that the permit may be issued as soon as possible. Please make the necessary arrangements to hold a public hearing concurrently with the public notice. TVA would like to have the final permit no later than May 31, 2007.

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Gordon G. Park  
Manager of Environmental Affairs  
5D Lookout Place

SCS:LPJ:SMF  
Enclosures  
cc (Enclosures):

Mr. Ruben Hernandez  
Regulatory Branch  
US Army Corps of Engineers  
3701 Bell Road  
Nashville, Tennessee 37214

M. T. Beckham, KFP 1A-KST (w/o Enclosures)	W. B. O'Brien, KFP 1A-KST
L. F. Campbell, KFP 1A-KST	A. L. Smith, LP 5D-C (w/o Enclosures)
B. K. Ellis, WT 11B-K	B. B. Walton, WT 6A-K (w/o Enclosures)
R. D. Nash, LP 2T-C	EDM, WT CA-K

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Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

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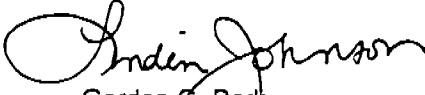
Ben O'Brien  
TVA Kingston Fossil Plant  
714 Swan Pond Road  
Harriman, Tennessee 37748

Email: [wbobrien@tva.gov](mailto:wbobrien@tva.gov)

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for Gordon G. Park  
Manager of Environmental Affairs  
5D Lookout Place

Enclosures

cc: Mr. Ruben Hernandez  
Regulatory Branch  
US Army Corps of Engineers  
3701 Bell Road  
Nashville, Tennessee 37214

United States Treasury

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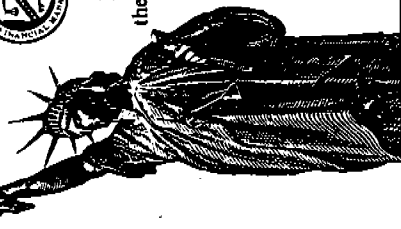
4912-80221128

Check No.

TENNESSEE VALLEY  
AUTHORITY  
KNOXVILLE, TN

\$1,000AND00/100

Pay to  
the order of



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TENNESSEE DEPARTMENT OF  
ENVIRONMENT AND CONSERVATION

VOID AFTER ONE YEAR

*Handwritten signature and date*

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APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT  
(33 CFR 325)

OMB APPROVAL NO. 0710-003  
Expires October 1996

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 (0710-0003), 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 location of 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 Robert Summers, Vice President Fossil Projects	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) N/A
6. APPLICANT'S ADDRESS TVA - Kingston Fossil Plant 1101 Market Street, LP 3K Chattanooga, Tennessee 37402	9. AGENT'S ADDRESS
7. APPLICANT'S PHONE NOS. W/AREA CODE  a. Residence  b. Business (423) 751-2491	10. AGENT'S PHONE NOS. W/AREA CODE  a. Residence  b. Business

11. STATEMENT OF AUTHORIZATION

I hereby authorize \_\_\_\_\_ 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.

APPLICANT'S SIGNATURE

DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions) TVA Kingston Fossil Plant - FGD Disposal Facility	
13. NAME OF WATERBODY, IF KNOWN (if applicable) Clinch River (Watts Bar Reservoir), approximate river mile 3, and wetlands	14. PROJECT STREET ADDRESS (if applicable)  TVA - Kingston Fossil Plant 714 Swan Pond Road Harriman, TN 37763
15. LOCATION OF PROJECT Roane TN COUNTY STATE	
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN. (see instructions)	
17. DIRECTIONS TO THE SITE	

18. Nature of Activity (Description of project, include all features)

TVA must construct a disposal facility for synthetic gypsum that will be produced as a byproduct of the installation of an FGD system for SO<sub>2</sub> air emissions control at KIF. The FGD is being installed to comply with 1990 Clean Air Act Amendments and Title IV requirements for EPA's Acid Rain Program and to improve overall air quality. Wetlands alterations are necessary at this site due to the lack of other appropriate disposal locations because of size needed, unsuitable topography, lack of suitable gypsum marketing capabilities, etc. While impacts have been minimized due to design and avoidance, construction of FGD disposal facilities will necessitate the alteration of wetlands areas by placing fill in them and/or altering drainage.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

See #18 above.

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

20. Reason(s) for Discharge

Placement of fill associated with construction and operation of FGD waste disposal facility.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

Combination of compacted clay, soil, rock, gypsum. Total quantities deposited in wetland area would depend upon marketing (avoided disposal) and how gypsum was placed. The total estimated production of gypsum is between 349,000 and 560,000 tons per year.

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

~4.81 acres in wetlands and embayments/conveyances.

23. Is Any Portion of the Work Already Complete? Yes \_\_\_\_\_ No X IF YES, DESCRIBE THE COMPLETED WORK

No construction has occurred associated with this phase of the project.

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

TVA - Kingston Fossil Plant

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
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Tennessee Aquatic Resource Alteration Permit and Corps of Engineers permit being applied for.

General Permit for Storm Water associated with construction activity has already been obtained for other project impacts and future impacts in this location.

\* 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.

  
SIGNATURE OF APPLICANT

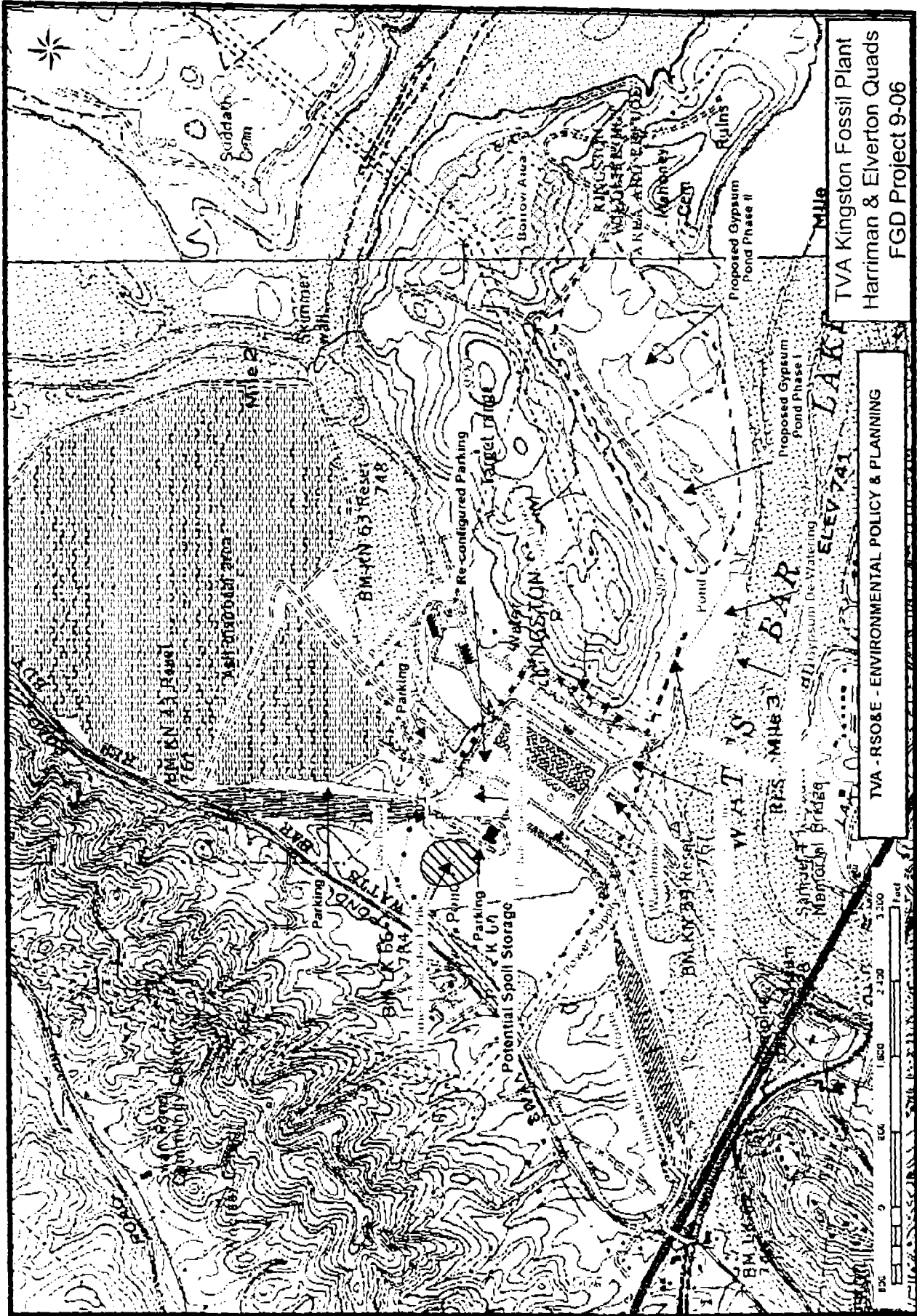
3/7/07  
DATE

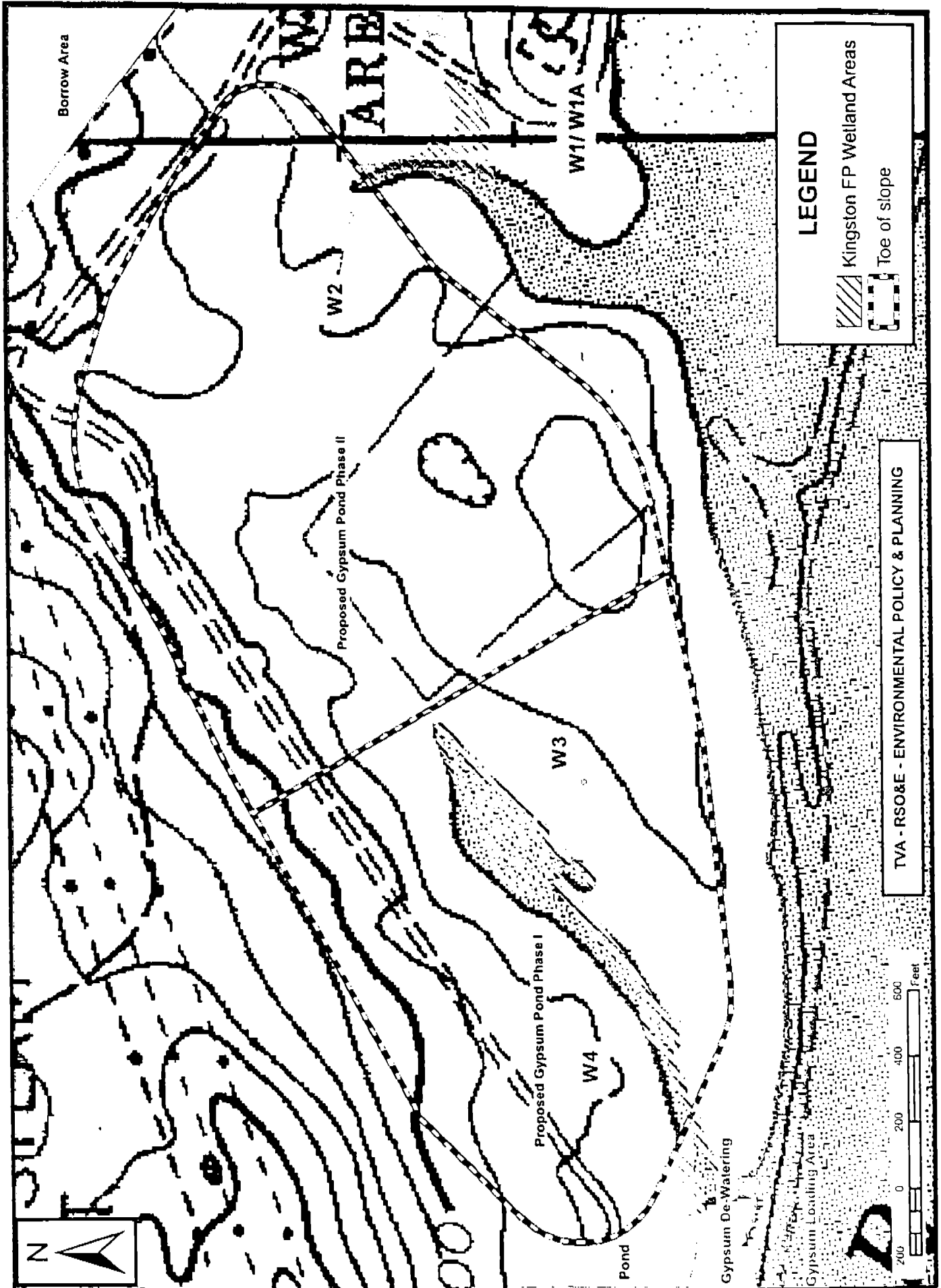
\_\_\_\_\_  
SIGNATURE OF AGENT

\_\_\_\_\_  
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 authorized agent if the statement in block 11 has been filled out and signed.

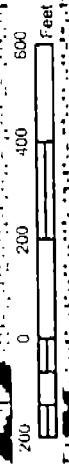
18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations 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.

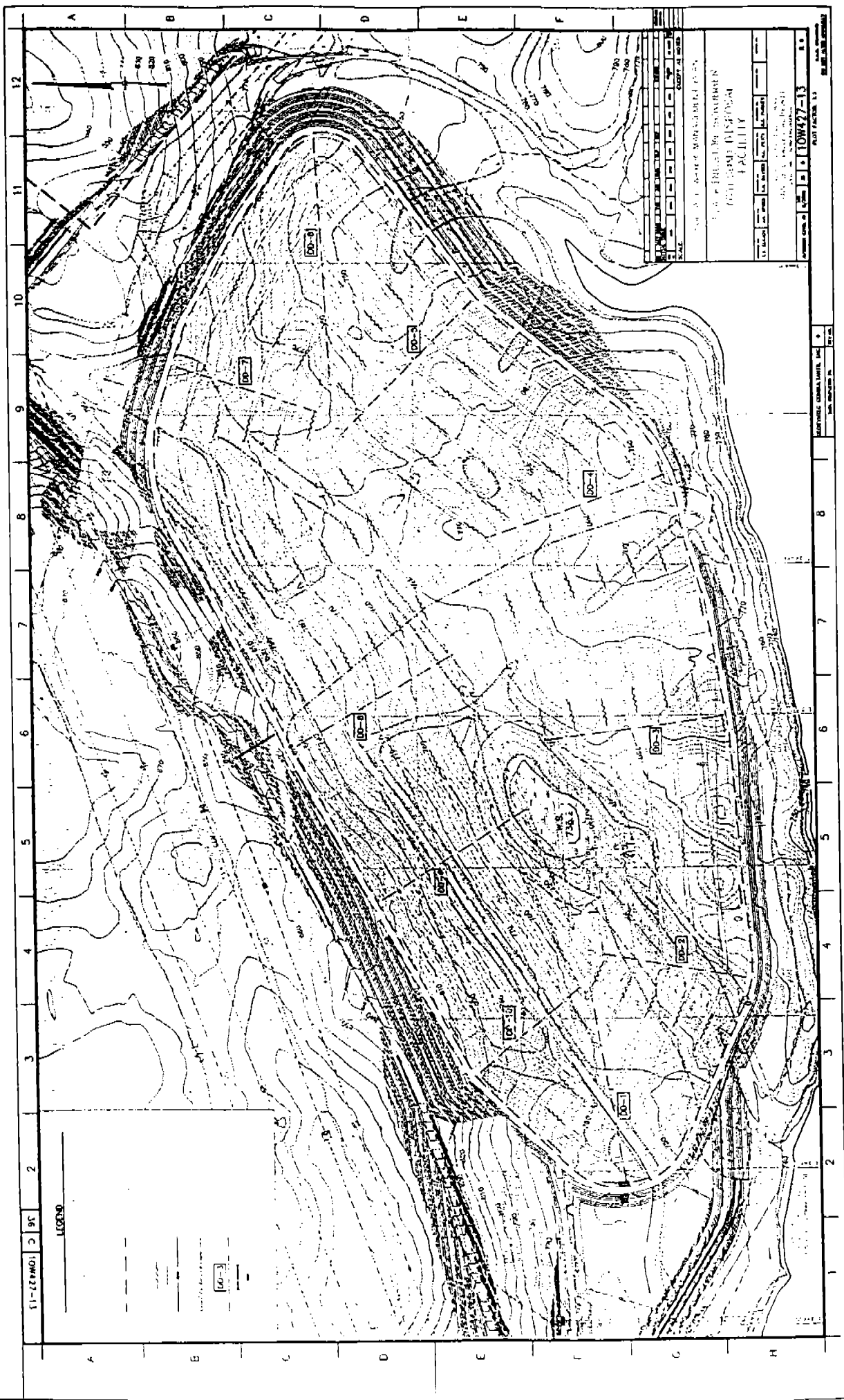




TVA - RSO&E - R&TA - GEOGRAPHIC INFORMATION & ENGINEERING 2006

TVA - RSO&E - ENVIRONMENTAL POLICY & PLANNING



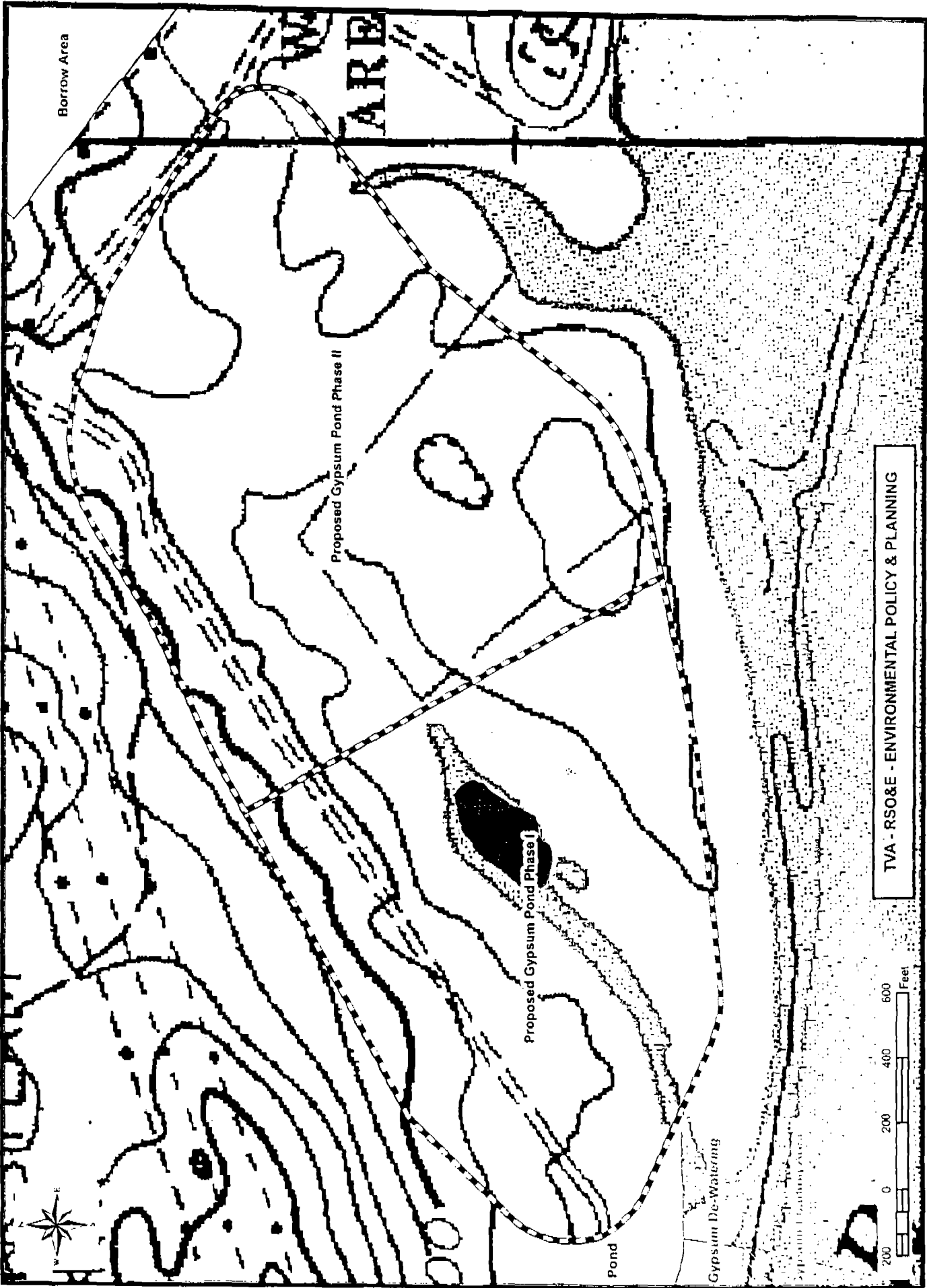


060307  
 36 C 10W427-15

TITLE PROJECT DRAWN BY CHECKED BY DATE	
PROJECT NO. 10W427-15 SHEET NO. 36 C	
SCALE 1" = 100'	
NORTH ARROW (Symbol pointing up)	
U.S. GEOLOGICAL SURVEY WASHINGTON, D.C.	

060307  
 36 C 10W427-15





TVA - RSO&E - ENVIRONMENTAL POLICY & PLANNING

200 0 200 400 600 Feet

200 0 200 400 600 Feet

200

400

600

Feet

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Feet

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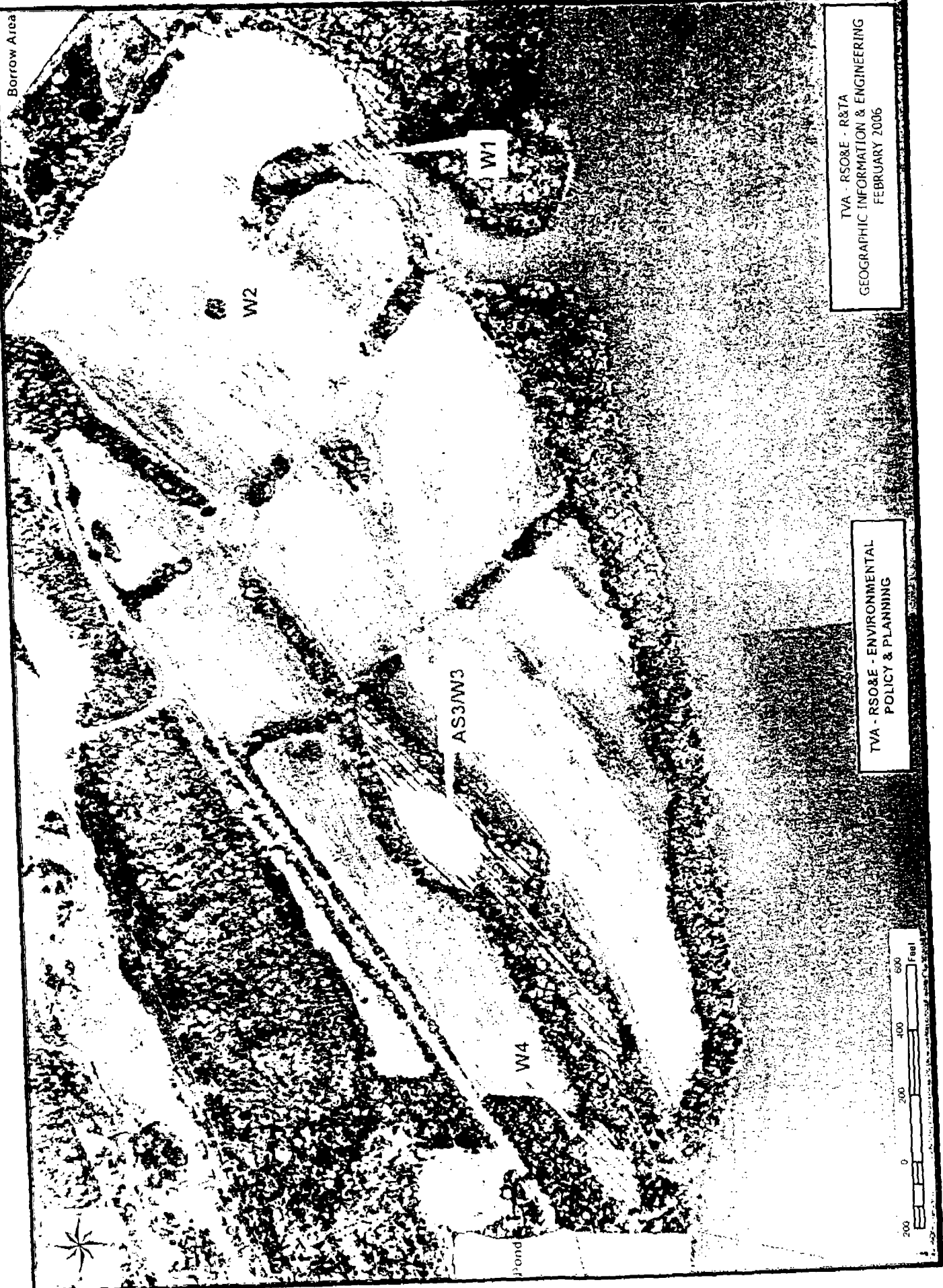
200

400

600

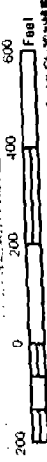
Feet

Borrow Area



TVA - RSO&E - R&TA  
GEOGRAPHIC INFORMATION & ENGINEERING  
FEBRUARY 2006

TVA - RSO&E - ENVIRONMENTAL  
POLICY & PLANNING



## Wetlands Report Text - October 2005

On October 13 and 17, 2005, a ground survey was conducted within the proposed project areas on the TVA KIF property to identify jurisdictional wetlands. Four wetlands were found (W1/W1A, W2, W3, and W4) and classified according to the Cowardin system (Cowardin et al., 1979). These wetlands are depicted on enclosures. Wetland determinations were performed according to USACE standards, which require documentation of hydrophytic vegetation, hydric soil, and wetland hydrology (Environmental Laboratory, 1987; Reed, 1997). Broader definitions of wetlands, such as that used by the U.S. Fish and Wildlife Service (Cowardin et al., 1979), the Tennessee definition (Tennessee Code 11-14-401), and the TVA Environmental Review Procedures definition (TVA, 1983), were also considered in this review. In addition, the TVA Rapid Assessment Method (TVARAM) was used to assess wetland condition and identify wetlands with special ecological significance (Mack, 2001).

The following text and Table 1 describe the findings of the initial assessment. Acreage of impacts has been reduced due to the modification of footprint for the FGD disposal facility and is shown below in italics.

Wetland W1/W1A is a fringe wetland encompassing two drainage ways on site and extending along an embayment of Watts Bar Reservoir. This wetland is classified as palustrine forested and is approximately 1.3 acres in size. Dominant vegetation include silver maple (*Acer saccharinum*), Chinese privet (*Ligustrum sinense*), sweet gum (*Liquidambar styraciflua*), and smooth alder (*Alnus serrulata*).

Wetland W2 is formed in a small depression at the head of an on-site drainage way. It is classified as palustrine forested and is approximately 0.05 acre in size. It is hydrologically connected to W1/W1A. Dominant vegetation includes silver maple, Chinese privet, red alder, and black willow (*Salix nigra*).

*Note: reduction in impact to W1/W1A/W2 is ~1.04 acres.*

Both W1/W1A and W2 are located within the proposed Gypsum Pond Phase 2 portion of the project area. Both wetland complexes meet USACE wetland determination standards and function in storm water retention, erosion control, and provision of wildlife habitat.

Wetland W3 consists of the fringe habitat along the channel/pond extending from the southwest through the center of the proposed Gypsum Pond Phase 1 project area. This complex is classified as palustrine forested and includes an open water pond and drainage channel connected to Watts Bar Reservoir. The majority of the drainage channel has been diked; however, wetland fringe habitat is present along the dike and extends through breaks in the dike. This wetland complex is approximately 3.9 acres in size and is dominated by sycamore (*Platanus occidentalis*), tulip poplar (*Liriodendron tulipifera*), smooth alder, Chinese privet, and silver maple.

Wetland W4 is a palustrine-forested complex connected hydrologically to W3 and located in the southwest corner of the Gypsum Pond Phase 1 project area. This area comprises 0.6 acre and receives hydrology from intermittent but temporary flooding associated with Watts Bar Reservoir water levels. Dominant vegetation includes Sweet

## Wetlands Report Text - October 2005

gum, red maple (*Acer rubrum*), Chinese privet, and Nepalese browntop (*Microstegium vimineum*).

Both W3 and W4 meet the U.S. Fish and Wildlife Service wetland definition and may be considered jurisdictional by the USACE under the Clean Water Act. Although the hydric soil parameter is absent in these wetland complexes, both wetlands appear to be the consequence of disturbance to the area's hydrologic regime. Ditching, diking, and channeling have altered drainage patterns such that hydrophytic vegetation dominates the temporarily or permanently saturated/inundated soils of these wetlands, although hydric soil indicators have not yet developed. Both wetland complexes function in storm water retention, erosion control, and provision of wildlife habitat.

<b>Table 1      Affected Wetlands</b>				
Wetland ID	Type <sup>a</sup>	Estimated Acreage	TVA RAM Score	TVA RAM Category
W1/W1A	PFO1B	~1.3	67.5	3
W2	PFO1C	~0.05	47.5	2
	subtotal	~1.35 acres 10/05 ~0.31 acres 9/06		
W3	PFO1E/PUB	~3.9	61	3
W4	PFO1A	~0.6	42	2
<b>TOTAL</b>		~5.85 acres 4.81 acres 9/06		

<sup>a</sup> Based on Cowardin et al. (1979)

## TVA Natural Heritage Project Routine Wetland Determination Form

Project: Kinston FP EA	Investigator: Jimmy Groton/Britta Dimick	Normal Circumstances: <input type="checkbox"/> Y	Sample ID: W1
County: Roane	Date: 10-13-2005	Atypical Situation: <input type="checkbox"/> Y	Station or Structure Number(s):
State: TN		Problem Area: <input type="checkbox"/> N	Cowardin Code: PF01B/

### Vegetation

Plant Species		Stratum	Indicator	Plant Species		Stratum	Indicator
1.	<i>Acer saccharinum</i>	Tree	FACW	9.	<i>Liquidambar styraciflua</i>	Tree	FAC+
2.	<i>Lycopus americanus</i>	Forb	OBL	10.	<i>Campsis radicans</i>	Vine	FAC
3.	<i>Boehmeria cylindrical</i>	Forb	FACW+	11.	<i>Cephalanthus occidentalis</i>	Shrub	OBL
4.	<i>Alnus serrulata</i>	Shrub	FACW+	12.	<i>Impatiens capensis</i>	Forb	FACW
5.	<i>Ligustrum sinense</i>	Tree	FAC	13.	<i>Chelone glabra</i>	Forb	OBL
6.	<i>Microstegium vimineum</i>	Forb	FAC+	14.			
7.	<i>Cornus amomum</i>	Shrub	FACW+	15.			
8.	<i>Platanus occidentalis</i>	Tree	FACW-	16.			

Percent of Dominant Species That are OBL, FACW, or FAC: 100 %

### Hydrology

Field Observations:		Wetland Hydrology Indicators:			
Depth of Surface Water: _____ (in.)		Primary Indicators		Secondary Indicators	
Depth to Free Water in Pit: _____ (in.)		_____ Inundated	_____ Drift Lines	<input checked="" type="checkbox"/> Oxidized Root Channels	
Depth to Saturated Soil: _____ 0 (in.)		<input checked="" type="checkbox"/> Saturated in Upper 12 in.	_____ Water Marks	_____ Water Stained Leaves	
		_____ Sediment Deposits	<input checked="" type="checkbox"/> Drainage Patterns		
Remarks: ASB1 WWC					

### Soils

Soil Unit: _____	Drainage class: _____	Listed hydric soil? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Profile Description:				
Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance	Texture
0-4	10YR4/3			SiL
4-8	10YR5/1	5YR4/6	Many	SiCL
8-12+	10YR4/1	5YR4/6 (ORC)	ORC	SiCL
Hydric Soil Indicators:				
<input type="checkbox"/>	Gleyed or Low Chroma Colors	_____ Histic Epipedon	_____ Aquic Moisture Regime	
<input type="checkbox"/>	Sulfidic Odor	_____ High Organic Cont. Surf. Layer Sandy Soils	<input checked="" type="checkbox"/>	Reducing Conditions
<input type="checkbox"/>	Concretions	_____ Organic Streaking in Sandy Soils	Other (Explain in Remarks)	
Remarks:				

### Wetland Determination

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Is this Sampling Point Within a USACE Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Does area only meet USFWS wetland definition?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Hydric Soils Present?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Is wetland mapped on NWI?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Estimated size:			

# Wetland Descriptors

Sample ID: W1      Photo ID(s): #1-5

Flagging Description: 1-32

## Drawing

Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations



Obvious Connections to Waters of the US/State?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Waterbody/Watershed: Clinch River
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Primary Water Source (If other, note in comments)	<input type="checkbox"/>	Cap. Fringe	<input type="checkbox"/>	Overbanking	<input type="checkbox"/>	Sheet Flow	<input type="checkbox"/>	Groundwater	<input checked="" type="checkbox"/>	Precipitation	<input checked="" type="checkbox"/>	Other (Reservoir)
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TVARAM SCORE:		TVARAM CATEGORY:	
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Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Wetland fringe on shore of embayment on Watts Bar and WWC ASB1.

Fed by ASB1, ASB2, and ASB3

**TVA Natural Heritage Project Routine Wetland Determination Form**

Project: Kinston FP EA	Investigator: Jimmy Groton/Britta Dimick	Normal Circumstances: <input checked="" type="checkbox"/> Y	Sample ID: W1A
County: Roane	Date: 10-13-2005	Atypical Situation: <input type="checkbox"/> N	Station or Structure Number(s):
State: TN		Problem Area: <input type="checkbox"/> N	Cowardin Code: PF01B

**Vegetation**

Plant Species	Stratum	Indicator	Plant Species	Stratum	Indicator
1. <i>Lonicera japonica</i>	Vine	FAC-	9. <i>Impatiens capensis</i>	Forb	FACW
2. <i>Phytolacca americana</i>	Forb	FACU+	10.		
3. <i>Boehmeria cylindrical</i>	Forb	FACW+	11.		
4. <i>Alnus serrulata</i>	Shrub	FACW+	12.		
5. <i>Ligustrum sinense</i>	Tree	FAC	13.		
6. <i>Microstegium vimineum</i>	Forb	FAC+	14.		
7. <i>Campsis radicans</i>	Vine	FAC	15.		
8. <i>Platanus occidentalis</i>	Tree	FACW-	16.		

Percent of Dominant Species That are OBL, FACW, or FAC: 88 %

**Hydrology**

<b>Field Observations:</b>	<b>Wetland Hydrology Indicators:</b>
Depth of Surface Water: _____ (in.)	<b>Primary Indicators</b>
Depth to Free Water in Pit: _____ (in.)	_____ Inundated
Depth to Saturated Soil: _____ (in.)	_____ Saturated in Upper 12 in.
	_____ Sediment Deposits
	_____ Drift Lines
	_____ Water Marks
	_____ Drainage Patterns
	<input checked="" type="checkbox"/> Oxidized Root Channels
	_____ Water Stained Leaves
Remarks: ASB2 WWC	

**Soils**

Soil Unit:	Drainage class:	Listed hydric soil?	Yes	No
<b>Profile Description:</b>				
Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance	Texture
0-3	10YR 4/3			SiL
3-10	2.5Y 6/1	10YR 5/6	Many	SiCL
10+	2.5Y 5/1	10YR 5/6	Many	SiCL
<b>Hydric Soil Indicators:</b>				
<input checked="" type="checkbox"/>	Gleyed or Low Chroma Colors	_____ Histic Epipedon	_____ Aquic Moisture Regime	
<input type="checkbox"/>	Sulfidic Odor	_____ High Organic Cont. Surf. Layer Sandy Soils	<input checked="" type="checkbox"/> Reducing Conditions	
<input type="checkbox"/>	Concretions	_____ Organic Streaking in Sandy Soils	_____ Other (Explain in Remarks)	
Remarks:				

**Wetland Determination**

Hydrophytic Vegetation Present?	Yes	<input checked="" type="checkbox"/> X	No	_____	Is this Sampling Point Within a USACE Wetland?	Yes	<input checked="" type="checkbox"/> X	No	_____
Wetland Hydrology Present?	Yes	<input checked="" type="checkbox"/> X	No	_____	Does area only meet USFWS wetland definition?	Yes	_____	No	_____
Hydric Soils Present?	Yes	<input checked="" type="checkbox"/> X	No	_____	Is wetland mapped on NWI?	Yes	<input checked="" type="checkbox"/> X	No	_____
Estimated size:									

# Wetland Descriptors

Sample ID: W1	Photo ID(s): #1-5
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Flagging Description: 1-32

## Drawing

Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations

Obvious Connections to Waters of the US/State?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Waterbody/Watershed: Clinch River
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Primary Water Source (If other, note in comments)	<input type="checkbox"/>	Cap. Fringe	<input type="checkbox"/>	Overbanking	<input type="checkbox"/>	Sheet Flow	<input type="checkbox"/>	Groundwater	<input checked="" type="checkbox"/>	Precipitation	<input checked="" type="checkbox"/>	Other (Reservoir)
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TVARAM SCORE:		TVARAM CATEGORY:	
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Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Wetland fringe on shore of embayment on Watts Bar and WWC ASB2.

Fed by ASB2.



**TVA Natural Heritage Project Routine Wetland Determination Form**

Project: Kinston FP EA	Investigator: Jimmy Grotor/Britta Dimick	Normal Circumstances:	<input checked="" type="checkbox"/> Y	Sample ID:	W2
County: Roane	Date: 10-13-2005	Atypical Situation:	<input type="checkbox"/> N	Station or Structure Number(s):	
State: TN		Problem Area:	<input type="checkbox"/> N	Cowardin Code:	PFO1/C

**Vegetation**

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	<i>Acer saccharinum</i>	Tree	FACW	9.			
2.	<i>Salix nigra</i>	Tree	OBL	10.			
3.	<i>Campsis radicans</i>	Vine	FAC	11.			
4.	<i>Alnus serrulata</i>	Shrub	FACW+	12.			
5.	<i>Ligustrum sinense</i>	Shrub	FAC	13.			
6.				14.			
7.				15.			
8.				16.			

Percent of Dominant Species That are OBL, FACW, or FAC: 100%

**Hydrology**

<b>Field Observations:</b>		<b>Wetland Hydrology Indicators:</b>			
Depth of Surface Water: _____ (in.)		<b>Primary Indicators</b>		<b>Secondary Indicators</b>	
Depth to Free Water in Pit: _____ (in.)		<input type="checkbox"/> Inundated	<input type="checkbox"/> Drift Lines	<input type="checkbox"/> Oxidized Root Channels	
Depth to Saturated Soil: _____ (in.)		<input type="checkbox"/> Saturated in Upper 12 in.	<input type="checkbox"/> Water Marks	<input type="checkbox"/> Water Stained Leaves	
		<input type="checkbox"/> Sediment Deposits	<input checked="" type="checkbox"/> Drainage Patterns		
Remarks: Formed along ASB2					

**Soils**

Soil Unit:		Drainage class:		Listed hydric soil?	Yes	No
<b>Profile Description:</b>						
Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance	Texture		
0-2				Oi		
2-5.5	7.5YR4/6	10YR7/1	Common	SiCL		
5.5-13+	10YR7/1	10YR7/6	Common	SiC		
<b>Hydric Soil Indicators:</b>						
<input checked="" type="checkbox"/>	Gleyed or Low Chroma Colors	<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> Aquic Moisture Regime			
<input type="checkbox"/>	Sulfidic Odor	<input type="checkbox"/> High Organic Cont. Surf. Layer Sandy Soils	<input checked="" type="checkbox"/> Reducing Conditions			
<input type="checkbox"/>	Concretions	<input type="checkbox"/> Organic Streaking in Sandy Soils	<input type="checkbox"/> Other (Explain in Remarks)			
Remarks:						

**Wetland Determination**

Hydrophytic Vegetation Present?	Yes	<input checked="" type="checkbox"/> X	No	<input type="checkbox"/>	Is this Sampling Point Within a USACE Wetland?	Yes	<input checked="" type="checkbox"/> X	No	<input type="checkbox"/>
Wetland Hydrology Present?	Yes	<input checked="" type="checkbox"/> X	No	<input type="checkbox"/>	Does area only meet USFWS wetland definition?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Hydric Soils Present?	Yes	<input checked="" type="checkbox"/> X	No	<input type="checkbox"/>	Is wetland mapped on NWI?	Yes	<input checked="" type="checkbox"/> X	No	<input type="checkbox"/>
Estimated size:									

# Wetland Descriptors

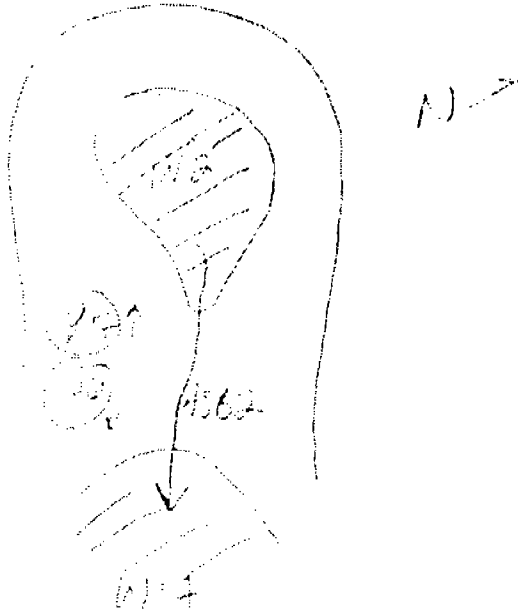
Sample ID: W2

Photo ID(s): Photo 6 and 7

Flagging Description:  
#1-5

## Drawing

Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations



Obvious Connections to Waters of the US/State?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Waterbody/Watershed: Clinch River							
Primary Water Source (If other, note in comments)	<input type="checkbox"/>	Cap. Fringe	<input type="checkbox"/>	Overbanking	<input type="checkbox"/>	Sheet Flow	<input type="checkbox"/>	Groundwater	<input checked="" type="checkbox"/>	Precipitation	<input checked="" type="checkbox"/>	Other (Reservoir)

TVARAM SCORE:  TVARAM CATEGORY:

Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Small wetland formed in a depression at head of ASB2.

**TVA Natural Heritage Project Routine Wetland Determination Form**

Project: Kinston FP EA	Investigator: Jimmy Grotov/Britta Dimick	Normal Circumstances: <input type="checkbox"/> Y	Sample ID: W3
County: Roane	Date: 10-13-2005	Atypical Situation: <input type="checkbox"/> Y	Station or Structure Number(s):
State: TN		Problem Area: <input type="checkbox"/> N	Cowardin Code: PFO1E/PUBh

**Vegetation**

Plant Species	Stratum	Indicator	Plant Species	Stratum	Indicator
1. <i>Platanus occidentalis</i>	Tree	FACW-	9. <i>Campsis radicans</i>	Vine	FAC
2. <i>Liriodendron tulipifera</i>	Tree	FAC	10. <i>Toxicodendron radicans</i>	Vine	FAC
3. <i>Boehmeria cylindrical</i>	Forb	FACW+	11. <i>Acer saccharinum</i>	Tree	FACW
4. <i>Alnus serrulata</i>	Shrub	FACW+	12. <i>Lonicera japonica</i>	Vine	FAC-
5. <i>Ligustrum sinense</i>	Shrub	FAC	13. <i>Salix nigra</i>	Tree	OBL
6. <i>Microstegium vimineum</i>	Forb	FAC+	14. <i>Elaeagnus umbellata</i>	Shrub	
7. <i>Itea virginica</i>	Shrub	FACW+	15. <i>Acer rubrum</i>	Tree	FAC
8. <i>Coccolus carolinus</i>	Vine	FAC	16. <i>Elaeagnus pungens</i>	Shrub	

Percent of Dominant Species That are OBL, FACW, or FAC: %

**Hydrology**

<b>Field Observations:</b>		<b>Wetland Hydrology Indicators:</b>			
Depth of Surface Water: _____ (in.)	<b>Primary Indicators</b>	<b>Secondary Indicators</b>			
Depth to Free Water in Pit: 5 (in.)	<input type="checkbox"/> Inundated	<input type="checkbox"/> Drift Lines	<input type="checkbox"/> Oxidized Root Channels		
Depth to Saturated Soil: _____ (in.)	<input checked="" type="checkbox"/> Saturated in Upper 12 in.	<input type="checkbox"/> Water Marks	<input type="checkbox"/> Water Stained Leaves		
	<input type="checkbox"/> Sediment Deposits	<input checked="" type="checkbox"/> Drainage Patterns			
Remarks:					

**Soils**

Soil Unit:	Drainage class:	Listed hydric soil?	Yes	No
<b>Profile Description:</b>				
Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance	Texture
0-3	10YR 3/3			SIL
3+	10YR 5/3			SiCL
<b>Hydric Soil Indicators:</b>				
<input type="checkbox"/> Gleyed or Low Chroma Colors	<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> Aquic Moisture Regime		
<input type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> High Organic Cont. Surf. Layer Sandy Soils	<input type="checkbox"/> Reducing Conditions		
<input type="checkbox"/> Concretions	<input type="checkbox"/> Organic Streaking in Sandy Soils	<input type="checkbox"/> Other (Explain in Remarks)		
Remarks:				

**Wetland Determination**

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Is this Sampling Point Within a USACE Wetland?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Does area only meet USFWS wetland definition?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Hydric Soils Present?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Is wetland mapped on NWI?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Estimated size:			

**Wetland Descriptors**

Sample ID: W3	Photo ID(s):												
Flagging Description:													
<b>Drawing</b>													
Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations													
Obvious Connections to Waters of the US/State?	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 40px;">Yes</td> <td style="width: 20px; text-align: center;"><input type="checkbox"/></td> <td style="width: 40px;">No</td> </tr> </table>	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No								
<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No										
Waterbody/Watershed: Clinch River													
Primary Water Source (If other, note in comments)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 40px; text-align: center;"><input type="checkbox"/></td> <td style="width: 40px;">Cap. Fringe</td> <td style="width: 40px; text-align: center;"><input type="checkbox"/></td> <td style="width: 40px;">Overbanking</td> <td style="width: 40px; text-align: center;"><input type="checkbox"/></td> <td style="width: 40px;">Sheet Flow</td> <td style="width: 40px; text-align: center;"><input type="checkbox"/></td> <td style="width: 40px;">Groundwater</td> <td style="width: 40px; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 40px;">Precipitation</td> <td style="width: 40px; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 40px;">Other (Reservoir)</td> </tr> </table>	<input type="checkbox"/>	Cap. Fringe	<input type="checkbox"/>	Overbanking	<input type="checkbox"/>	Sheet Flow	<input type="checkbox"/>	Groundwater	<input checked="" type="checkbox"/>	Precipitation	<input checked="" type="checkbox"/>	Other (Reservoir)
<input type="checkbox"/>	Cap. Fringe	<input type="checkbox"/>	Overbanking	<input type="checkbox"/>	Sheet Flow	<input type="checkbox"/>	Groundwater	<input checked="" type="checkbox"/>	Precipitation	<input checked="" type="checkbox"/>	Other (Reservoir)		
TVARAM SCORE:	TVARAM CATEGORY:												
Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)													
Follows ASB3.													

**TVA Natural Heritage Project Routine Wetland Determination Form**

Project: Kinston FP EA	Investigator: Jimmy Groton/Kim Pilarski	Normal Circumstances:	Y	Sample ID:	W4
County: Roane		Atypical Situation:	Y	Station or Structure Number(s):	
State: TN	Date: 10-17-2005	Problem Area:	?	Cowardin Code:	PFO1A

**Vegetation**

	Plant Species	Stratum	Indicator		Plant Species	Stratum	Indicator
1.	<i>Platanus occidentalis</i>	Tree	FACW-	9.	<i>Campsis radicans</i>	Vine	FAC
2.	<i>Carex tribuloides</i>	Forb	FACW+	10.	<i>Toxicodendron radicans</i>	Vine	FAC
3.	<i>Boehmeria cylindrical</i>	Forb	FACW+	11.	<i>Acer saccharinum</i>	Tree	FACW
4.	<i>Lyquidambar styraciflua</i>	Tree	FAC	12.	<i>Rubus argutus</i>	Shrub	FAC
5.	<i>Ligustrum sinense</i>	Shrub	FAC	13.	<i>Bignonia capreolata</i>	Vine	FAC
6.	<i>Microstegium vimineum</i>	Forb	FAC+	14.	<i>Acer negundo</i>	Tree	FACW
7.	<i>Carex crinita</i>	Forb	FACW+	15.	<i>Acer rubrum</i>	Tree	FAC
8.	<i>Polygonum pennsylvanica</i>	Forb	FACW	16.	<i>Prunus serotina</i>	Tree	FACU

Percent of Dominant Species That are OBL, FACW, or FAC: 94%

**Hydrology**

<b>Field Observations:</b>		<b>Wetland Hydrology Indicators:</b>	
Depth of Surface Water: _____ (in.)		<b>Primary Indicators</b>	
Depth to Free Water in Pit: _____ (in.)		_____ Inundated	_____ Drift Lines
Depth to Saturated Soil: _____ (in.)		_____ Saturated in Upper 12 in.	_____ Water Marks
		_____ Sediment Deposits	X _____ Drainage Patterns
<b>Secondary Indicators</b>			
		_____ Oxidized Root Channels	_____ Water Stained Leaves
Remarks:			

**Soils**

Soil Unit:		Drainage class:		Listed hydric soil?	Yes	No
<b>Profile Description:</b>						
Depth (Inches)	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance	Texture		
0-6	2.5YR 4/6			SiCL		
6-8	2.5YR 5/6	10YR 4/2	common	SiCL		
8-14+	7.5YR 4/6			SiCL		
<b>Hydric Soil Indicators: Soil not hydric.</b>						
_____ Gleyed or Low Chroma Colors	_____ Histic Epipedon	_____ Aquic Moisture Regime				
_____ Sulfidic Odor	_____ High Organic Cont. Surf. Layer Sandy Soils	_____ Reducing Conditions				
_____ Concretions	_____ Organic Streaking in Sandy Soils	_____ Other (Explain in Remarks)				
Remarks:						

**Wetland Determination**

Hydrophytic Vegetation Present?	Yes	X	No	Is this Sampling Point Within a USACE Wetland?	Yes	No	X
Wetland Hydrology Present?	Yes		X	Does area only meet USFWS wetland definition?	Yes	X	No
Hydric Soils Present?	Yes		X	Is wetland mapped on NWI?	Yes	X	No
Estimated size: primary indicator of wetland hydrology are drainage patterns - no direct indicators present							

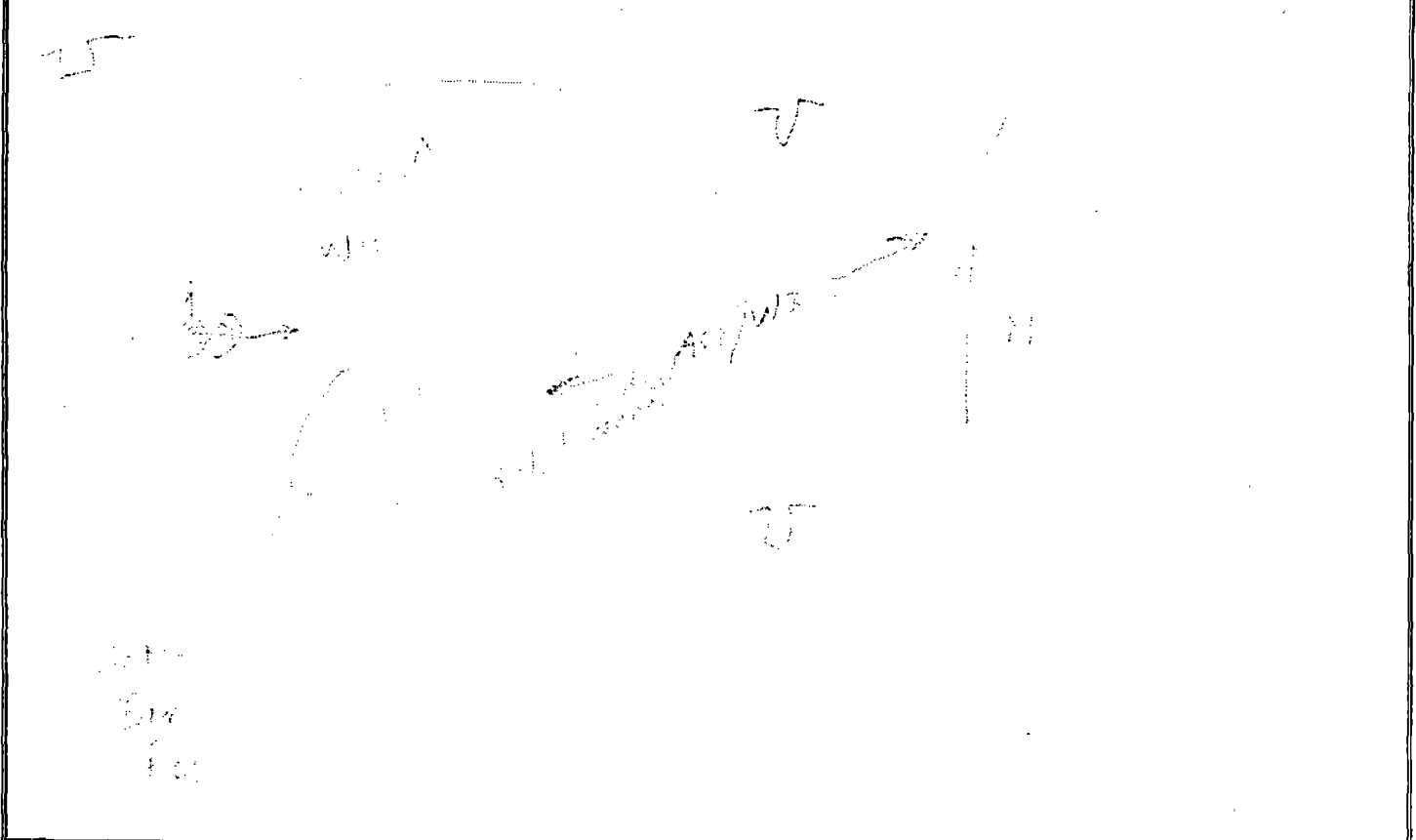
**Wetland Descriptors**

Sample ID: W4      Photo ID(s): #1-2

Flagging Description: #1-15, clockwise from SE corner

**Drawing**

Please Include: North Arrow, Project Centerline, Survey Corridor Boundaries, Length of Wetland Feature, Distances from Centerline, Photo Locations



Obvious Connections to Waters of the US/State?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Waterbody/Watershed: Clinch River
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Primary Water Source (If other, note in comments)	<input type="checkbox"/>	Cap. Fringe	<input type="checkbox"/>	Overbanking	<input type="checkbox"/>	Sheet Flow	<input checked="" type="checkbox"/>	Groundwater	<input type="checkbox"/>	Precipitation	<input checked="" type="checkbox"/>	Other (Reservoir)	<input checked="" type="checkbox"/>
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TVARAM SCORE:		TVARAM CATEGORY:	
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Description of Wetland and Other Comments: (i.e. forest age class; habitat features; hydrologic regime; description of the wetland outside of or adjacent to ROW; erosion potential, existing disturbances, adjacent land use, wildlife observations, station numbers, lat-long, etc)

Associated with drainage channel/diked.

Heavy population of invasives, especially *Microstegium*; lesser amount of *Privet*.

Connected hydrologically with ASB3/W3.

Site: W1/W1A

Rater(s): Jimmy Groton/Britta Dimick

Date: 10/13/05

**2** **2**  
max 6 pts. subtotal

**Metric 1. Wetland Area (size)**

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- >50 acres (>20.2 ha) (6 pts)
- 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
- 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
- 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
- 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
- 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
- <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

- Aerial photo
- Ground survey

**12** **14**  
max 14 pts. subtotal

**Metric 2. Upland Buffers and Surrounding Land Use**

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

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

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

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

**27** **41**  
max 30 pts. subtotal

**Metric 3. Hydrology**

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

- High pH groundwater (5)
- Other groundwater (3) [BR/CM (5)]
- Precipitation (1) (unless BR/CM primary source (5))
- Seasonal/intermittent surface water (3)
- Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

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

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

- >0.7 m (27.6 in.) (3)
- 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
- <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

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

- Semi- to permanently inundated/saturated (4)
- Regularly inundated/saturated (3) [BR/CM (4)]
- Seasonally inundated (2) [BR/CM (4)]
- Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

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

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

Check all disturbances observed

- ditch
- tile (including culvert)
- dike
- weir
- stormwater input
- point source (nonstormwater)
- filling/grading
- road bed/RR track
- dredging
- other WATTS BAR RESERVOIR

**17.5** **58.5**  
max 20 pts. subtotal

**Metric 4. Habitat Alteration and Development**

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

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

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

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

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

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

Check all disturbances observed

- mowing
- grazing
- clearcutting
- selective cutting
- farming
- toxic pollutants
- shrub/sapling removal
- herbaceous/aquatic bed removal
- woody debris removal
- sedimentation
- dredging
- nutrient enrichment

**58.5**

Subtotal this page

Site: <b>W1/W1A</b>	Rater(s): <b>Jimmy Groton/Britta Dimick</b>	Date: <b>10/13/05</b>
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<b>58.5</b>
subtotal previous page

<b>3</b>	<b>61.5</b>	<b>Metric 5. Special Wetlands</b>
max 10 pts	subtotal	

<b>3</b>
raw score*

\*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m. sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha), old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland (1st order perennial or above) (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe) G1\*(10), G2\*(5), G3\*(3) [\*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1\*(10), G2\*(5), G3\*(3) [\*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

<b>6</b>	<b>67.5</b>	<b>Metric 6. Plant Communities, Interspersion, Microtopography</b>
max 20 pts	subtotal	

6a. Wetland vegetation communities.  
Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- Shrub
- Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other \_\_\_\_\_

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre  
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.  
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3) [BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

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

6c. Coverage of invasive plants.  
Add or deduct points for coverage.

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

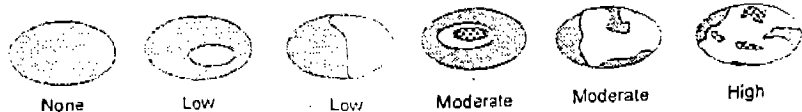
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.  
Score all present using 0 to 3 scale.

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

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

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

<b>67.5</b>	<b>GRAND TOTAL (max 100 pts)</b>
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Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: [www.fws.gov/oram/04010ram030305.pdf](http://www.fws.gov/oram/04010ram030305.pdf)



Site: W2

Rater(s): Jimmy Groton

Date: 10/13/05

0 0

max 8 pts subtotal

**Metric 1. Wetland Area (size)**

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- >50 acres (>20.2 ha) (6 pts)
- 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
- 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
- 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
- 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
- 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
- <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

- Aerial photo
- Ground survey

10 10

max 14 pts subtotal

**Metric 2. Upland Buffers and Surrounding Land Use**

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

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

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

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

26 36

max 30 pts subtotal

**Metric 3. Hydrology**

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

- High pH groundwater (5)
- Other groundwater (3) [BR/CM (5)]
- Precipitation (1) [unless BR/CM primary source (5)]
- Seasonal/intermittent surface water (3)
- Perennial surface water (lake or stream) (5)

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

- >0.7 m (27.6 in.) (3)
- 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
- <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

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

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

3b. Connectivity. Score all that apply.

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

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

- Semi- to permanently inundated/saturated (4)
- Regularly inundated/saturated (3) [BR/CM (4)]
- Seasonally inundated (2) [BR/CM (4)]
- Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

- ditch
- tile (including culvert)
- dike
- weir
- stormwater input
- point source (nonstormwater)
- filling/grading
- road bed/RR track
- dredging
- other \_\_\_\_\_

15.5 45.5

max 20 pts subtotal

**Metric 4. Habitat Alteration and Development**

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

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

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

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

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

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

Check all disturbances observed

- mowing
- grazing
- clearcutting
- selective cutting
- farming
- toxic pollutants
- shrub/sapling removal
- herbaceous/aquatic bed removal
- woody debris removal
- sedimentation
- dredging
- nutrient enrichment

45.5

<b>Site: W2</b>	<b>Rater(s): Jimmy Groton/Britta Dimick</b>	<b>Date: 10/13/05</b>
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<b>45.5</b>
subtotal previous page

<b>3</b>	<b>48.5</b>	<b>Metric 5. Special Wetlands</b>
max 10 pts	subtotal	

<b>3</b>
raw score*

\*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (4.5 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh, buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1\*(10), G2\*(5), G3\*(3) [\*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1\*(10), G2\*(5), G3\*(3) [\*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated or mined/excavated land (-10)

<b>-1</b>	<b>47.5</b>	<b>Metric 6. Plant Communities, Interspersion, Microtopography</b>
max 20 pts	subtotal	

6a. Wetland vegetation communities.  
 Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- Shrub
- Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other \_\_\_\_\_

**Vegetation Community Cover Scale**  
 0 = Absent or <0.1 ha (0.25 acre) contiguous acre  
 [For BR/CM <0.04 ha (0.1 acre)]  
 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality  
 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality  
 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.  
 Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3) [BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

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

6c. Coverage of invasive plants.  
 Add or deduct points for coverage.

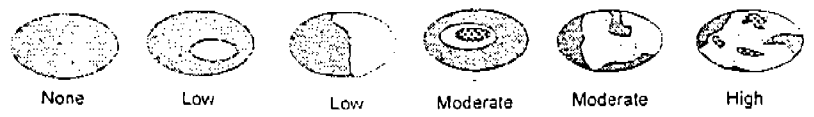
- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

**Mudflat and Open Water Class Quality**  
 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]  
 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]  
 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]  
 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.  
 Score all present using 0 to 3 scale.

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

Hypothetical Wetland for Estimating Degree of Interspersion



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

<b>47.5</b>
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**GRAND TOTAL (max 100 pts)**

Refer to the most recent ORAN Score Calibration Report for the scoring breakpoints between wetland categories at the following address: <http://www.eca.state.or.us/dw/401401.html>

<b>Site:</b> W3	<b>Rater(s):</b> Jimmy Groton/Britta Dimick	<b>Date:</b> 10/13/05
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<b>3</b>	<b>3</b>
max 6 pts.	subtotal

### Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- >50 acres (>20.2 ha) (6 pts)
- 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
- 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
- 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
- 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
- 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
- <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

<b>12</b>	<b>15</b>
max 14 pts.	subtotal

### Metric 2. Upland Buffers and Surrounding Land Use

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

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

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

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

<b>20</b>	<b>35</b>
max 30 pts.	subtotal

### Metric 3. Hydrology

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

- High pH groundwater (5)
- Other groundwater (3) [BR/CM (5)]
- Precipitation (1) [unless BR/CM primary source (5)]
- Seasonal/intermittent surface water (3)
- Perennial surface water (lake or stream) (5)

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

- >0.7 m (27.6 in.) (3)
- 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
- <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

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

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

3b. Connectivity. Score all that apply.

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

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

- Semi- to permanently inundated/saturated (4)
- Regularly inundated/saturated (3) [BR/CM (4)]
- Seasonally inundated (2) [BR/CM (4)]
- Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

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

<b>14</b>	<b>49</b>
max 20 pts.	subtotal

### Metric 4. Habitat Alteration and Development

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

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

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

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

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

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

Check all disturbances observed

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

<b>49</b>
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Site: W3	Rater(s): Jimmy Groton/Britta Dimick	Date: 10/13/05
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<b>49</b>
subtotal previous page

<b>3</b>	<b>52</b>
max 10 pts	subtotal

### Metric 5. Special Wetlands

<b>3</b>
raw score*

- \*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.
- Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).
- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq m, sphagnum or other moss (5); muck, organic soil layer (3)
  - Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
  - Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
  - Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
  - Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
  - Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
  - Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
  - Ecological community with global rank (NatureServe): G1\*(10), G2\*(5), G3\*(3) [\*use higher rank where mixed rank or qualifier]
  - Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1\*(10), G2\*(5), G3\*(3) [\*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
  - Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
  - Cat. 1 (very low quality): <1 acre (0.4 ha) AND EITHER >90% cover of invasives OR nonvegetated on mined/excavated land (-10)

<b>9</b>	<b>61</b>
max 20 pts	subtotal

### Metric 6. Plant Communities, Interspersion, Microtopography

- 6a. Wetland vegetation communities.  
 Score all present using 0 to 3 scale.
- Aquatic bed
  - Emergent
  - 1 Shrub
  - 2 Forest
  - Mudflats
  - 1 Open water <20 acres (8 ha)
  - Moss/lichen. Other \_\_\_\_\_

Vegetation Community Cover Scale

0 = Absent or <0.1 ha (0.25 acre) contiguous acre  
 [For BR/CM <0.04 ha (0.1 acre)]

1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality

2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality

3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

- 6b. Horizontal (plan view) interspersion.  
 Select only one.
- High (5)
  - Moderately high (4) [BR/CM (5)]
  - 3 Moderate (3) [BR/CM (5)]
  - Moderately low (2) [BR/CM (3)]
  - Low (1) [BR/CM (2)]
  - None (0)

Narrative Description of Vegetation Quality

low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species

mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species

high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

- 6c. Coverage of invasive plants.  
 Add or deduct points for coverage.
- Extensive >75% cover (-5)
  - Moderate 25-75% cover (-3)
  - 1 Sparse 5-25% cover (-1)
  - Nearly absent <5% cover (0)
  - Absent (1)

Mudflat and Open Water Class Quality

0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]

1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]

2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]

3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

- 6d. Microtopography.  
 Score all present using 0 to 3 scale.
- Vegetated hummocks/tussocks
  - 1 Coarse woody debris >15 cm (6 in.)
  - Standing dead >25 cm (10 in.) dbh
  - 2 Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion

None      Low      Low      Moderate      Moderate      High

Microtopography Cover Scale

0 = Absent

1 = Present in very small amounts or if more common of marginal quality

2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality

3 = Present in moderate or greater amounts and of highest quality

<b>61</b>	<b>GRAND TOTAL (max 100 pts)</b>
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Rater to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: <http://www.wet.state.or.us/354-421-421.html>

Site: W4

Rater(s): Jimmy Groton/Kim Pilarski

Date: 10/17/05

**3** **3**  
max 6 pts subtotal

**Metric 1. Wetland Area (size)**

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- >50 acres (>20.2 ha) (6 pts)
- 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
- 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
- 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
- 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
- 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
- <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

**10** **13**  
max 14 pts subtotal

**Metric 2. Upland Buffers and Surrounding Land Use**

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

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

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

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

**18** **31**  
max 30 pts subtotal

**Metric 3. Hydrology**

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

- High pH groundwater (5)
- Other groundwater (3) [BR/CM (5)]
- Precipitation (1) [unless BR/CM primary source (5)]
- Seasonal/intermittent surface water (3)
- Perennial surface water (lake or stream) (5)

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

- >0.7 m (27.6 in.) (3)
- 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
- <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

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

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

3b. Connectivity. Score all that apply.

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

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

- Semi- to permanently inundated/saturated (4)
- Regularly inundated/saturated (3) [BR/CM (4)]
- Seasonally inundated (2) [BR/CM (4)]
- Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

<input checked="" type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input checked="" type="checkbox"/> filling/grading
<input checked="" type="checkbox"/> dike	<input checked="" type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> other reservoir

**10** **41**  
max 20 pts subtotal

**Metric 4. Habitat Alteration and Development**

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

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

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

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

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

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

Check all disturbances observed

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

**41**  
subtotal this page

Site: W4

Rater(s): Jimmy Groton/Kim Pilarski

Date: 10/17/05

41

subtotal previous page

3

44

max 10 pts

subtotal

### Metric 5. Special Wetlands

3

raw score\*

\*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (well. &/or adj. upland) incl. >0.25 acre (0.1 ha): old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1\*(10), G2\*(5), G3\*(3) [\*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1\*(10), G2\*(5), G3\*(3) [\*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality): <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

-2

42

max 20 pts

subtotal

### Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities. Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- Shrub
- Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other \_\_\_\_\_

#### Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre  
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion. Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

#### Narrative Description of Vegetation Quality

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

6c. Coverage of invasive plants. Add or deduct points for coverage.

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

#### Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.

- Score all present using 0 to 3 scale.
- Vegetated hummocks/tussocks
  - Coarse woody debris >15 cm (6 in.)
  - Standing dead >25 cm (10 in.) dbh
  - Amphibian breeding pools

#### Hypothetical Wetland for Estimating Degree of Interspersion



#### Microtopography Cover Scale

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

42

GRAND TOTAL (max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: [http://www.ecu.state.or.us/tsw/401\\_401.html](http://www.ecu.state.or.us/tsw/401_401.html)

DROWNING CREEK  
MITIGATION PROJECT PROPOSAL

CUMBERLAND COUNTY TENNESSEE

February 2007

Prepared for:

Tennessee Valley Authority  
Environmental Affairs, LP 5D-C  
Chattanooga, Tennessee

Tennessee Department of Environment and Conservation  
Division of Water Pollution Control  
Nashville, Tennessee

Prepared by:

MRW Properties LLC  
P.O. Box 102  
32 North Main Street  
Sparta, Tennessee 38583

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## **BACKGROUND**

The mitigation site is located adjacent to Joe Tabor Road in Cumberland County, Tennessee; site coordinates are W85.07825, N36.04028 (Figure 1). The project site was surveyed on February 15, 2007 and was found to be approximately 27 acres in size with approximately 19.5 acres being suitable for wetland mitigation activities. The Hydrogeomorphic (HGM) classification for this wetland site is Riverine.

The site, which is in the floodplain of Drowning Creek, historically was forested but has been cleared and converted to pasture (Figure 2). Portions of the site are drained by rim ditches that intercept overland flow from uplands, and by internal ditches that convey floodwaters to the creek. The majority of the site (approximately 19.5 acres) is degraded wetland, although small inclusions of upland habitat do occur. These upland areas likely were the natural levees and ridges that were formed as the creek meandered back and forth across its floodplain and deposited material during flood events. Such upland features are natural and integral components of most riverine systems.

The objective of this proposal is to detail how alterations to the hydrology and plant community will be reversed such that (given sufficient time) the site will have the characteristics and functions of forested riverine wetlands in this portion of the State. The ultimate goal of the project is to restore and enhance site quality to the point that it will be suitable for the Tennessee Valley Authority to use as mitigation for unavoidable wetland impacts at the Kingston Steam Plant in adjacent Roane County.

The following site description is based on an evaluation conducted by Ken Morgan and Tom Roberts (MRW Properties). Regulatory agency personnel who have visited the site include Mike Lee with the Tennessee Department of Environment and Conservation (TDEC) and Ruben Hernandez with the Nashville District of the U. S. Army Corps of Engineers (USACE).

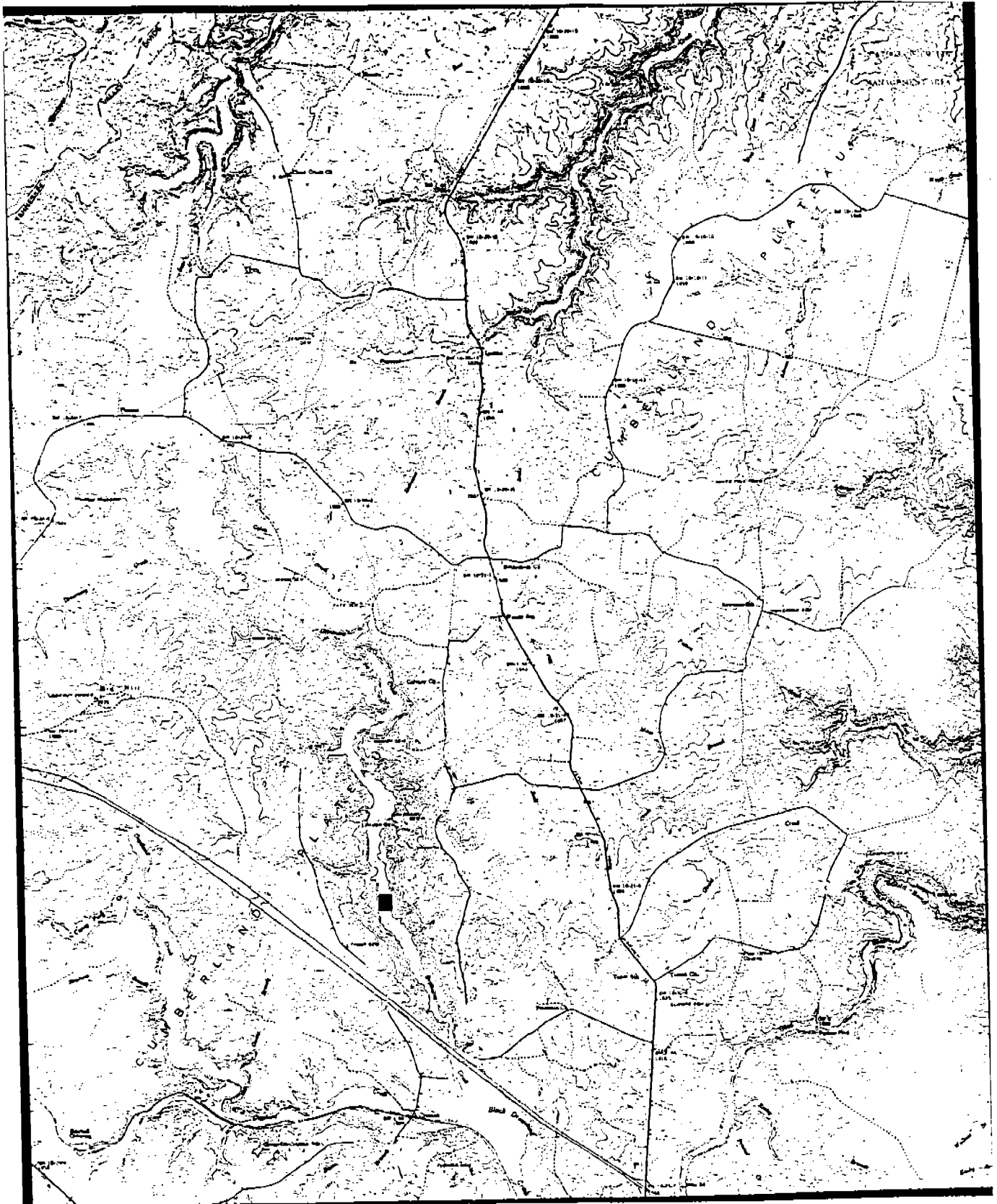


Figure 1. Approximate location of site northeast of Crossville, TN on the Isoline Quadrangle marked in red.



Figure 2. View of site showing grazed pasture. Excavated and ditched areas are indicated by taller vegetation in the center of the photo.

## VEGETATION

The entire site currently is dominated by herbaceous species including tall fescue (*Festuca arundinacea*) in higher areas, with soft rush (*Juncus effusus*), fox sedge (*Carex vulpinioidia*), and other species tolerant of soil saturation in areas where the water table is near the surface (Figure 3). Cattail (*Typha latifolia*) and woolgrass (*Scirpus cyperinus*) are found in several areas that had been excavated to create watering areas for livestock (Figure 4). Giant cane (*Arundinaria* sp.), panic grass (*Panicum* sp.), goldenrods (*Solidago* spp.), blackberry (*Rubus* spp.), and other weedy species occur in a narrow strip between the pasture and Drowning Creek (Figure 5).

The dominant vegetation community in unaltered riverine wetlands in central and eastern Tennessee (Burns and Honkala 1990) is forest with the overstory composed primarily of willow oak (*Quercus phellos*), water oak (*Q. nigra*), white oak (*Q. alba*), cherrybark oak (*Q. pagodaformis*), green ash



Figure 3. View of site showing grazed pasture dominated by fescue and various species of sedges and rushes.

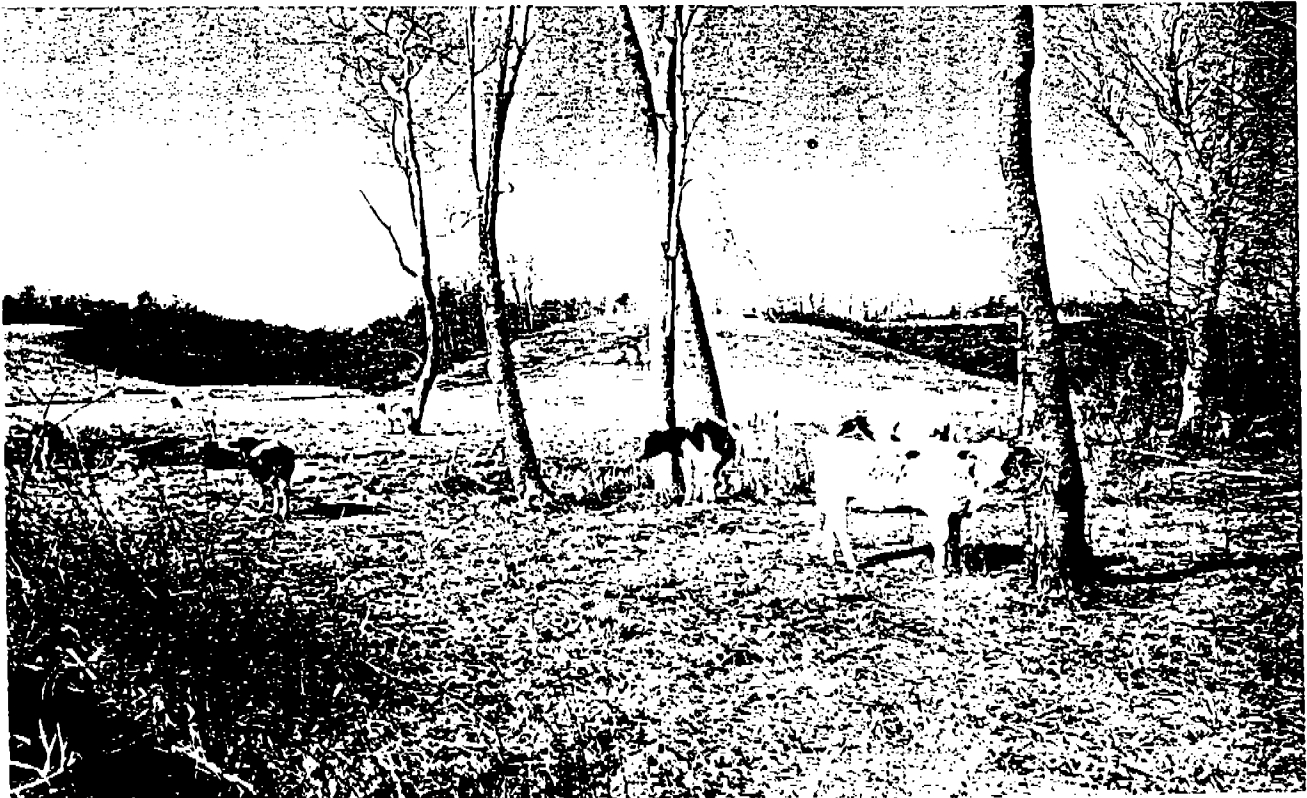


Figure 4. View of site showing excavated watering areas being used by livestock.



Figure 5. View of site showing strip of vegetation between pasture and Drowning Creek.

(*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and hackberry (*Celtis occidentalis*). Common understory species include various dogwoods (*Cornus* spp.), ironwood (*Carpinus caroliniana*), and possumhaw (*Icturnum nudum*). Numerous other species can occur depending on individual site conditions and disturbance history. Given the current condition of the proposed mitigation site, the plant community clearly is different and significantly degraded relative to reference wetlands within the region.

### SOILS

The only soil series mapped at the site is Atkins, described taxonomically as a Fluvaquentic Endoaquept. Field examination of the soil agreed with the following description from the National Cooperative Soils Survey (<http://webhome.crk.usda.gov/ncss/ncss.html>). The texture in the upper 5 inches (A horizon) is a dark gray brown (10YR 4/2) loam, from 5 to 8 (AB horizon), a dark gray brown (10YR 4/2) loam, from 8 to 14 inches (B<sub>g1</sub> horizon), a gray brown (10YR 5/2) loam, and 14 to 26

inches (Bg2 horizon), a gray brown (2.5YR 5/2) loam. Redoximorphic features occur in all four horizons. Atkins is a very deep, poorly drained floodplain soil that formed in acid alluvium washed from uplands. It is nearly level, but includes concave or linear features; slopes range from 0 to 3 percent. Surface water runoff from Atkins is negligible and permeability is classified as slow to moderate (0.06 to 2.0 inches /hour) in the subsoil. The series does not possess a fragipan and the water table that may be near the surface from winter until early summer is described as *apparent*. Atkins is on the national list of hydric soils and also on the list for Cumberland County

Atkins soils are not well suited to row crops or even pasture without artificial drainage, but many areas in central and eastern Tennessee have been converted to such uses. Pastures generally are of poor quality. Regardless of the intended land use, drainage is necessary to lower the groundwater level to a depth that will allow plants not adapted to saturated conditions to survive and grow. In addition to the on-line soil survey, *Wet Soils of Tennessee* (Talley and Monteith 1994) was a source of information on the characteristics of the Atkins series.

## **HYDROLOGY**

The hydrology of the site has been altered by a series of ditches that were excavated to facilitate the production of livestock forage. Along the western boundary of the site, a rim ditch that runs approximately North – South (Figure 6) intercepts runoff that would flow across the site from the adjacent uplands and channels it to Drowning Creek. Other ditches (Figure 7) have been dug in the internal portions of the site for the purpose of removing surface water following rainfall events. Ditches and drainage tiles can be somewhat effective in lowering groundwater levels in soils such as Atkins as subsurface water flows laterally toward them. Whereas deep ditches can lower the groundwater table for a considerable distance, those at the proposed mitigation site are quite shallow and have not had a significant effect of groundwater hydrology. Based on wetland indicator status of the dominant plants and field observations of the water table, almost all the site that historically had been wetland apparently has retained sufficient hydrology to



Figure 6. View of rim ditch that runs across most of the site, eventually conveying surface water into Drowning Creek.



Figure 7. View of interior ditches that convey floodwater to Drowning Creek.

still be categorized as jurisdictional wetland. Only portions of the site that naturally are slightly higher in elevation and narrow areas within the zone of influence of the ditches would not be classified as wetland.

The hydrology of unaltered riverine wetlands with Atkins soils that are adjacent to moderate-sized creeks and streams in central and eastern Tennessee is characterized by a combination of overbank flooding and a water table that is near the surface well into the growing season. Although overbank flooding does occur, especially during winter and early spring, flood durations are brief and flooding is not the primary source of hydrology driving the creation and maintenance of the wetlands. The Atkins series is described as having an apparent high water table from the surface to 1 foot below the surface during winter and spring. Depressions in portions of some sites may pond water well into the growing season. The series is listed in *Hydric Soils of the United States* as being hydric due to Criteria 2b3 (a high water table).

Given the current condition of the proposed mitigation site, it is clear that the hydrologic regime there has been degraded relative to reference wetlands within the region. The ditch system is effective in removing surface water from overbank events and flood duration likely is substantially shorter than that which would occur in unaltered systems. However, unlike many similar areas that have been effectively drained with a series of deep ditches or underground tiles, groundwater levels at this site remain near the surface and still exert an influence on the soils and plant community.

## **PROPOSED ENHANCEMENT**

The modifications to the hydrology, the removal of the native forest community, and the continuous intensive grazing by livestock have resulted in significant, but reversible, degradation. Because two of the site's fundamental characteristics (landscape position and soils) have not been altered and while a third characteristic (hydrology) has been altered but not removed, the site is an excellent candidate for enhancement activities. Once the following plan is implemented, there is a high probability of success and given time for the plant community to develop, the site will support a productive, high quality riverine



wetland. Such wetlands are not common in central and eastern Tennessee, thus the proposed mitigation site will be a valuable addition to the State's wetland base.

## VEGETATION

The approximately 19.5 acres of degraded wetland acreage will be planted with native tree species that occur in riverine wetlands of the area. Although the site is relatively level, it maintains its normal microtopographical variability (due to stream processes and tree "tip-ups"). Planting locations for each species thus will be determined by relative elevations of the site and the individual species tolerance to saturation and inundation. Species include willow oak, cherrybark oak, white oak, green ash, persimmon (*Diospyros virginiana*), and others recommended by local regulatory personnel. If available, one or more of the water-tolerant dogwoods (*Cornus* spp.), ironwood, and possumhaw will be planted as understory species based on availability.

Overcup oak (*Q. lyrata*) which is known to occur in portions of central Tennessee, will be planted in the lowest portions of the site if approved by the regulatory agencies. Willow oak, green ash, dogwood, and ironwood will be planted at intermediate elevations. Higher portions of the site will be planted primarily with white oak, cherrybark oak, and persimmon. Trees will be planted on ten-foot centers along sinuous rows at a density of 450/acre. No one species will comprise more than 40% of the trees planted. Species such as sweetgum and red maple likely will volunteer and become established on their own. Once mature, this suite of planted and volunteer tree species will provide an abundance of food and cover for a variety of wildlife including mammals, birds, reptiles, and amphibians characteristic of riverine wetlands in the area. Additionally, during the early and intermediate stages of succession, the area will be a highly diverse plant community that supports specialized species that depend on seral habitats. Examples include the common yellowthroat (*Geothlypis trichas*) and yellow warbler (*Dendroica petechia*).

## HYDROLOGY

To enhance the hydrology of the site and return it to pre-alteration conditions, the ditches on the site will be filled. This will prevent the drainage of surface water and will restore groundwater hydrology

in a narrow zone immediately near the ditches. Care will be taken not to damage the remaining trees that have been left standing. In areas with little microtopography, ditches will be blocked, not filled to create small pools for the purpose of enhancing on-site diversity and providing additional breeding habitat for amphibians. These activities will result in a total of 19.5 acres of enhancement credit, a sufficient amount to offset losses at TVA's Kingston steam plant.

## **PROPOSED MONITORING**

Monitoring of the mitigation site will aid in determining if it is returning to pre-alteration conditions. Collection of this data will be used to determine if the project can be considered a success, or if mid-course modifications are warranted. Monitoring of the site will take place annually for a five-year period. Details of the monitoring program are described in the sections below.

### **HYDROLOGY AND SOILS**

Once work on the ditches has been completed, 3 shallow groundwater wells will be installed in the northern, central, and southern portions of the site. Monitoring of the 3 wells will take place periodically from early March to early June in order to determine if the hydroperiod of the site has returned to that consistent with an unaltered Atkins soil. Presence and depth of ponding in the micro-depressions will be noted. Soil from areas judged to be characteristic of the site will be described; information from the upper 18 inches of the soil profile that will be recorded includes texture, Munsell color, and types and abundance of redoximorphic features present.

### **VEGETATION**

Monitoring the survival of planted trees throughout the site will be conducted in fall. Percent survival of planted trees will be determined by walking rows and tallying trees as either living or dead. In addition to survival data, the overall composition of the plant community will be determined by visual estimates of the dominant species. Data collected will include total percent cover, percent cover by species, and species richness.

## **WILDLIFE**

Utilization of the site by wildlife will be documented during site visits conducted to monitor hydrology and sample vegetation. Monitoring of wildlife will include direct observations and aural verification, as well as evidence of presence such as tracks, hair, nests, and eggs. A list of wildlife species will then be produced for each monitoring period.

## **PHOTOGRAPHIC DOCUMENTATION**

Photographs of the mitigation site will be taken from numerous points established prior to the first monitoring event. Each point will be marked by driving a PVC pipe into the ground; GPS coordinates of each location will be recorded. Photographs will be taken at these points during every monitoring event to provide a record of the changes that take place as the plant community matures.

## **MONITORING REPORTS**

Monitoring reports will enable the regulatory agencies to determine if the proposed mitigation is successful based on pre-determined performance standards. Reports will include locations of transects and photographic points, monitoring protocol, and results and evaluation of data collected. Specifically data on hydrology, vegetation, and soils will be evaluated to determine if the criteria for being considered jurisdictional wetland as described in the 1987 Wetland Delineation Manual (U. S. Army Corps of Engineers 1987) are met.

## **PERFORMANCE STANDARDS/CRITERIA**

The success or failure of the mitigation efforts ultimately will be determined by the hydroperiod, vegetation structure and composition, and soil conditions that develop at the site following the restoration and enhancement actions proposed. The following performance standards/criteria will be used to make that determination.

1. The site should develop and maintain a hydroperiod that is consistent with a Atkins soil by the end of the five-year monitoring period.

2. Species in the FAC, FACW, or OBL categories should cover no less than 70% of the site by the end of the second-year monitoring period.
3. Survival of planted trees at the site will be no less than 70% at the end of each monitoring period.

If any of these standards are not met, corrective measures will be taken and monitoring will continue on an annual basis until they are met. At the end of the monitoring period, a deed restriction as outlined by TDEC will be placed on the property to ensure its long-term protection.

## LITERATURE CITED

- Talley T. S. and S. Monteith. 1994. Tennessee Wetland Conservation Strategy. Technical Report Series: Wet Soils of Tennessee. Tennessee State Planning Office. Nashville, TN. Tennessee Department of Environment and Conservation.
- United States Department of Agriculture. 1997. Natural Resources Conservation Service. 1997. Hydrology Tools for Wetland Determination. Chapter 18: Engineering Field Handbook. Donald E. Woodard, ed. Fort Worth Texas.
- Burns, R. M. and B. H. Honkala. 1990. Silvics of North America: 2. Hardwoods. Agricultural Handbook 654. U. S. Department of Agriculture, Forest Service, Washington, DC. 877 pp.
- U. S. Army Corps of Engineers. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. Waterways Experiment Station. Vicksburg, MS.