

APPENDIX G

Revised Mitigation Plan

SCOTT ENGINEERING COMPANY

1530 POLK STREET – HIGHWAY 45 NORTH – CORINTH, MS 38834 – (662) 287-2436

October 31, 2005

Ms. Amy Robinson
U.S. Army Engineer District, Nashville
Corps of Engineers
3701 Bell Road
Nashville, TN 37214

RE: Proposed Hawkins Lake - Highway 224, McNairy County, Tennessee
"APPLICATION for AQUATIC RESOURCE ALTERATION PERMIT"
Revision: October 28, 2005

Dear Ms. Robinson,

Transmitted herewith is one bound copy of the above-referenced application with mitigation plans for your review and consideration. I have also included a CD with a copy of the application in its entirety in portable document format (.pdf) for your convenience. I am also forwarding a hard copy of the plan and a CD to Robbie Baker of TDEC. Robbie Sykes, Robert Todd, Sanford Davis and Randy Lowe will each receive a CD as well.

Let this letter serve as the official response to Robbie Sykes' concerns forwarded via email dated August 18, 2005, as well as a "General Commentary" to the revised application. Responses to questions/comments numbered 1 through 5 from the above-mentioned email are:

1. Do you have any plans other than "stream sections 5, 6, and 27 will be restored in accordance with guidelines established by the Tennessee Stream Mitigation Review Team (TSMRT), and reasonable measures will be taken to prevent sedimentation damage to public and private property" (pg 10)?

Appendix I of the October 28, 2005 revision of the ARAP application provides proposed plans for the Restoration of stream sections 10, 5 and 27 and also provides the location for Enhancement I compensatory mitigation along stream sections 6 and 9. The pattern, profile and dimensions of the proposed restored streams are based on actual field measurements taken along stream sections 10 and 27. As indicated on Sheet No. M2, two riffle/pool complexes will be established per meander wavelength, and the introduction of in-stream habitat and grade control structures will be utilized as indicated on sheet M2 as well.

NOV 02 2005

2. Is the mitigated stream length for stream sections 5, 6, and 27 given in Table 2 the length of the existing stream or the length of the proposed mitigation channel?

Table 2 on page 8 of the ARAP application has been revised and should be self-explanatory. The existing stream length on which the mitigation will be performed is given as well as the post-mitigation stream length. Additional credit for the creation of a lengthened stream has been considered in this revision and is shown as Replacement and credited at a 1:1 ratio. Refer to Appendix I for detailed and conceptual drawings of the proposed mitigation activity.

3. Are you proposing that the riparian buffers would consist of 50 feet of woody cover (i.e. trees) and 20 feet of grass for a total of 70 feet, or 30 feet of woody cover and 20 feet of grass for a total of 50 feet? We would like to see a minimum of 50 feet of woody cover on each side of the stream.

Initially, the 50-ft riparian buffer zone included only 30 feet of woody species with 20 feet of grass and would begin at bank full elevation for a total of 50 feet. Due to the size, morphology and function of the existing streams to be impounded and those to be mitigated, the owner would like the TSMRT to consider allowing the 20-ft grass buffer as part of the minimum 50-ft buffer zone. However, if the TSMRT will not consider a variance in this regard, the owner has agreed to provide the minimum 50-ft of woody riparian buffer along each mitigated stream section and an optional 20-ft grass buffer may be installed along select locations for purposes of habitat introduction.

4. It appears that you are only proposing to re-establish a riparian buffer in the areas that you are seeking Enhancement I credit. The Guidelines state that Enhancement I involves any partial combination of bank stabilization, livestock exclusion, introduction of in-stream habitat, and riparian zone restoration (pg 13). Something else in addition to the riparian restoration is needed to receive full Enhancement I credit.

In accordance with the stream mitigation guidelines, the Enhancement I mitigation along stream sections 6 and 9 will include livestock exclusion. In fact, all mitigation activity will be protected from the interference of livestock.

Ms. Amy Robinson
October 31, 2005
Page 3

5. Table 2 indicates that you are seeking 940 credit feet for 7,520 feet of riparian restoration. Will this work take place strictly along Little Owl and Owl Creek? Will actual riparian zone restoration work take place along the entire 7,520 feet, or just portions that do not have adequate buffers? I noticed that you did exclude the riparian lengths for the other streams that tied into these two creeks. But, as I recall during our on site visit, much of Owl Creek already had suitable riparian zone.

Due to the sporadic nature of the riparian buffer along Little Owl Creek and Owl Creek, as well as the lack of credit (8:1) and increased amount of territory required (180 feet from bank full elevation), all mitigation activity along these creeks will be eliminated as indicated within the application.

I hope that we have successfully answered any concerns that have been brought to our attention thus far. Please feel free to contact me if there are any questions or comments about this or the enclosures. Additional hard copies of the plans and application will be provided if needed.

Sincerely,



Shane Cardwell, E.I.

MSC:sc

CC: Mr. Bill Hawkins (hard copy and CD)
Mr. Robbie Baker, TDEC (hard copy and CD)
Mr. Robbie Sykes, USFWS (CD)
Mr. Robert Todd, TWRA (CD)
Mr. Randy Lowe, TVA (CD)
Mr. Sanford Davis, TVA (CD)
File

Encl: ARAP Application
CD

APPLICATION
FOR
AQUATIC RESOURCE ALTERATION PERMIT

Prepared for:

Mr. Bill Hawkins

HAWKINS DAM

McNairy County, Tennessee

Prepared by:

Scott Engineering Company
1530 Polk Street
Corinth, Mississippi 38834

September 13, 2004
Revised: July 13, 2005
Revised: October 28, 2005

TABLE OF CONTENTS

1.	PROJECT INFORMATION.....	3
	A. Location.....	3
	B. Description.....	3
	C. Existing Stream Resources.....	5
	D. Existing Soil Conditions.....	5
2.	MITIGATION GOALS AND OBJECTIVES.....	5
	A. Impact Site.....	5
	B. Mitigation Site.....	6
3.	MITIGATION PLAN.....	8
	A. Proposed Mitigation Activity.....	8
	B. Proposed Mitigation Types.....	9
	C. Planned Vegetation.....	12
4.	MONITORING PLAN.....	13
	A. General.....	13
	B. Monitoring Requirements.....	14
	C. Stream Morphology Monitoring.....	15
	D. Habitat Assessment.....	15
	E. Assessment Methods.....	15
	F. Success Criteria.....	16
5.	SITE PROTECTION.....	17
6.	PROPOSED METHODS FOR MAINTAINING WATER QUALITY STANDARDS FOLLOWING CONSTRUCTION OF THE DAM.....	17
7.	APPENDIX.....	20
	A. Construction Plans (47-Acre Impoundment).....	20
	B. Application for Certificate of Approval to the Safe Dams Division of the TDEC.....	26
	C. Letter to Safe Dams Division concerning the intended use of the Impoundment.....	28
	D. Gregg Overstreet letter dated August 27, 2004.....	29
	E. Gregg Overstreet letter dated June 1, 2005.....	31
	F. NRCS Plant Fact Sheets (Switchgrass and Lespedeza).....	33
	G. Habitat Assessment forms.....	37
	H. Conservation Easement (Model).....	41
	I. Mitigation Plans.....	49
	J. Soil Survey Information (NRCS – Soil Survey – McNairy Co.).....	54
	K. ARAP Application.....	62
	L. Joint Application (Department of the Army/TVA).....	64

1. Project Information

A. Location

The subject property consists of approximately 910 acres in the 7th Civil District of McNairy County, Tennessee, adjoining Tennessee State Route 224 (also known as the Stantonville-Pebble Hill Road) to the west and Little Owl Creek and Owl Creek to the north, as shown on Sheet No. 1 of the Construction Plans located in Appendix A.

Approximately 235 acres of the subject property is low-lying along the banks of Little Owl Creek and Owl Creek and primarily used for agricultural purposes. The remaining 675 acres consist of undulating ridge tops and hillsides protected by woodlands with some areas utilized as pasture land. The subject property has remained virtually unimproved.

B. Description

The proposed project will consist of the construction of a dam approximately 900 feet in length with a crest width of 20 feet (see Table 1 below for additional Dam and Reservoir information).

Table 1. Description of Dam and Reservoir

Maximum Height:	<u>38</u> ft	Crest Length:	<u>900</u> ft	Crest Width:	<u>20</u> ft
Drainage Area:	<u>500</u> acres		<u>0.78</u> square miles		
Reservoir Surface Area (acres):		Normal Pool		Emergency Spillway	Top of Dam
Reservoir Storage (acre-ft):		47		51	55
		697		794	899
USGS Map No.	<u>13-SW</u>	Dam center line:	Latitude:	<u>35° 06' 42.8"</u>	
			Longitude:	<u>88° 25' 42.8"</u>	

The Safe Dams Division of the Tennessee Department of Environment and Conservation (TDEC) has classified the proposed impoundment as a "Farm Pond", due to its use as primarily recreational and/or agricultural and will remain closed to the general public. The proposed dam has been designed in accordance with the rules and regulations provided by the Safe Dams Division of the TDEC. An application has been filed with the Division, which is included in Appendix B for reference purposes. Likewise, a letter to the Safe Dams Division

concerning the intended use of the impoundment is also included in Appendix C.

The dam will have a principle spillway intake structure with an outlet pipe placed beneath the dam as shown in Appendix A. A concrete lined emergency spillway located at the east end of the dam will also be constructed with a crest elevation of 2 feet above the principle spillway elevation. A new access road for the property will also be constructed that will run along the centerline of the dam and connect to Tennessee State Route 224.

The proposed earth dam will be constructed of on-site material excavated from the side slopes of the proposed impoundment and within the basin area as well. Additional off-site fill material may be required for construction of the dam, especially within the core, if the material available on-site is determined unsuitable for the application. Currently, a detailed soil investigation has not been performed within the project area. Soil characteristics within the site have been determined by information provided by the NRCS "Soil Survey of McNairy County, Tennessee". Some of the soil types mapped within the area may not be well suited as construction material for the dam, especially the impervious core. The material used for construction shall be inspected and approved by Scott Engineering Company for suitability. Should the need arise to use borrow material, it will be the responsibility of the Contractor to contact Scott Engineering Company so that appropriate tests may be conducted to determine its suitability. Necessary revisions in the SWPPP will be made to include such borrow areas. Borrow pits, where select material is retrieved, will be considered part of the project and the appropriate erosion prevention and sediment control Best Management Practices (BMP's) at the borrow location will be utilized by the Contractor.

Pre-construction timber cutting will be employed to remove all trees within the normal pool storage area of the impoundment. Initial site clearing and grubbing will take place within the area of the proposed dam as well as the areas where excavated material for the dam will be obtained.

Approximately 25 acres of clearing and grubbing will be required for construction of the dam and entrance roadway. Material used for construction of the dam will be excavated primarily from the main basin of the impoundment comprising approximately 14 acres with an average excavated depth of approximately 3.5 feet. Material will be excavated, hauled and dumped in place by heavy machinery including but not limited to: tractors and pans, scrapers, excavators and dozers. Material will be packed in-place by sheep foot rollers and/or vibratory rollers. Material within the core of the dam shall be installed in 8-inch compacted layers for the total height of the dam. The geotechnical

engineer will administer all quality control tests and inspections performed throughout the project.

The principle spillway will consist of a 36-inch diameter corrugated aluminum riser with a 24-inch diameter corrugated aluminum outlet pipe running beneath the dam. A 12-inch diameter class 900 PVC pipe will be installed prior to construction as a means of maintaining a base flow throughout the duration of the project. Once the dam is completed, the pipe will be converted into the emergency drawdown structure, as indicated on Sheet No. 3 of the Construction Plans (see Appendix A). The emergency drawdown facility will be capable of evacuating 75% of the total storage volume at normal pool elevation within a ten-day period (design criteria in accordance with the Rules and Regulations provided by the Safe Dams Division of the TDEC).

The emergency spillway will consist of a concrete weir near the east end of the dam that will transition to a grass-lined flume or open channel. Reference is also hereby made to Appendix A, concerning further details for the proposed impoundment.

C. Existing Stream Resources

Two intermittent streams that converge just north of the construction area are present on the site and flow northerly into Little Owl Creek. Several other wet-weather conveyances and/or streams exist on the property, along with two small farm ponds. Refer to Section 2 "Mitigation Goals and Objectives" for additional information on the existing, impacted streams.

D. Existing Soil Conditions

County soil survey maps indicate that the soils present within the impact area of construction for the impoundment are in the luka, Oktibbeha, Sumter and Saffell series. The soils within the mitigation areas belong to the luka, Enville, Una, Hatchie, and Saffell series. Refer to Appendix J for additional information on specific soil characteristics within the subject property. A portion of Map Sheet #23 (Soil Survey of McNairy County, Tennessee) is provided in Appendix A on Sheet No. 1 of the Construction Plans.

2. Mitigation Goals and Objectives

A. Impact Site

The proposed 47-acre impoundment will be constructed on two unnamed tributaries of Little Owl Creek in McNairy County, Tennessee. The proposed impoundment will eliminate approximately

7,625 linear feet of combined streams and wet-weather conveyances. As indicated on Sheet 1 of the Construction Plans located in Appendix A, the impact site has two primary reaches that converge just north of the proposed dam centerline. The smaller, westernmost reach has a gravel bottom and is approximately five to six feet deep and three to six feet wide. The primary channel that extends throughout the length of the proposed impoundment also has a gravel bottom and is approximately six to seven feet deep and seven to ten feet wide. Each reach has a well-established riparian buffer zone with exception to a few areas where pasturelands extend along the top of the stream banks and where cattle and farm equipment have crossed the streams. Where a substantial canopy to shade the existing streams is lacking, an adequate filter strip of native grasses and small shrubs exist to filter sediment and protect the stream banks from erosion.

Mr. Gregg Overstreet of the Tennessee Department of Environment and Conservation has performed on-site stream inspections on two occasions. The first on-site inspection occurred in August of 2004 and the second in May of 2005. During the initial field inspection, it was determined that the two unnamed tributaries of Little Owl Creek on which the dam is to be constructed would be classified as intermittent streams. However, a second field assessment of the upstream sections of the proposed impoundment was requested in an effort to determine if some portions of the impounded streams could be classified as wet-weather conveyances, which would eliminate the requirement of compensatory mitigation for such sections. Following the on-site visit in late May of 2005, approximately 1,725 linear feet of stream was determined to be wet-weather conveyances and excluded from any compensatory mitigation activity. Reference is hereby made to Appendix D and Appendix E containing copies of the letters written by Mr. Gregg Overstreet concerning the stream assessments.

B. Mitigation Site

Following the reduction in the overall length of intermittent stream impounded, approximately 5,900 (7,625 feet less 1,725 feet of wet-weather conveyances, as per Gregg Overstreet, TDEC) linear feet of intermittent stream is to be impounded within the 47-acre lake. According to the Stream Mitigation Guidelines prepared by the TDEC Division of Water Pollution Control, an impoundment is classified as a Type II Stream Alteration, which requires compensatory mitigation for 75% of the total stream length impounded. Thus, 4,425 feet of compensatory stream mitigation will be provided in accordance with the credit ratios published in the Stream Mitigation Guidelines for the State of Tennessee.

All of the proposed mitigation activity will be located downstream of the proposed impoundment and will be performed entirely on the owner's

property. Efforts to offset the impacts of the proposed impoundment will primarily involve the restoration and/or enhancement of existing stream sections within the cropland along Little Owl Creek and Owl Creek. The restoration of select impaired stream sections will involve returning the significantly degraded streambed to a natural meander having the appropriate width, pattern and profile based on reference reach conditions. Such restoration activity will also include rebuilding a functional riparian zone that would be typical of a healthy natural stream. The remainder of the mitigation activity will involve the re-establishment of native herbaceous and woody vegetation in the riparian zone along the banks of the indicated streams.

Despite the elimination of the existing intermittent streams within the impoundment, the proposed lake will assist in decreasing downstream erosion and flooding, as well as supply a wide range of aquatic and wildlife habitat. In addition, the mitigation activity associated with the restoration and riparian buffer enhancement along the existing stream sections below the proposed dam will greatly improve the site by:

- **Trapping Eroded Soils¹:** USDA reports that up to 64 percent of the sediment found in streams come from cropland, pasture, and range. Eroded soils cloud the water, suffocate fish eggs, and scratch the delicate gills of fish. Sediment fills streams and pushes floodwaters out of banks. A healthy buffer can stop up to 70 percent of the soil from entering a stream.
- **Treats Land Runoff:** Overland runoff and drainage tile can carry fertilizers and pesticides directly into streams. Buffers are "last chance stops" where these pollutants are broken down by plants and soil microbes before pollutants can enter streams. Tree and grass buffers remove up to 50 percent of the nitrate and phosphorus in water that might otherwise pollute a stream.
- **Holds Down Flood Damage:** Trees and shrubs block floating debris from washing onto upland areas. Forest and shrub buffers have stems that slow water and roots that hold soil in place. Grasses, sedges, and rushes reduce soil erosion and increase the amount of water entering soil. Riparian areas with trees generally experience less damage than those planted to grass or crops.
- **Increases Stream Flows in Summer:** Forest buffer soils take in water up to 15 times faster than pasture or cropland soils. This "buffer sponge" has tremendous water storage capacity and slowly releases water to add to summer flows.
- **Provides Food for the Biggest Fish:** Overhanging trees and shrubs drop leaves, twigs, and insects into the water and become food sources for aquatic insects. The aquatic insects are eaten by small fish, which are eaten by bigger fish, and so on up the food chain. Trees fall into the stream and provide log shelters for fish.

Small, well-shaded streams can supply up to 75 percent of the food base for an entire river system from the headwaters to an ocean estuary.

- **Creates Habitat for Wildlife:** Small animals come down to drink, eat, shelter, and hide in the green curves next to water. Larger animals travel the cool corridors that connect one habitat area to another.

3. Mitigation Plan

A. Proposed Mitigation Activity

Table 2 below indicates the proposed stream sections offered for compensatory stream mitigation. The selection of streams in which the mitigation activity is to be performed was based primarily on recommendations provided by representatives from the TDEC, USACE, TVA, USFWS, and TWRA following the on-site meeting on February 23, 2005. Detailed mitigation plans are included in Appendix I for the restoration of stream sections 10, 5 and 27. The proposed restoration activity is based on reference reach conditions that were obtained by field measurements on the final 300 to 400 feet of stream sections 10 and 27, before their convergence with Owl Creek. Both pattern and profile characteristics of the proposed restored streams are modeled after these reference reaches.

Table 2. Proposed Location, Classification and Quantity of Mitigation Activity.

Stream Section ^a	Existing Length to be Mitigated ^b (ft)	Restored and/or Enhanced Length ^c (ft)	Mitigation Class	Ratio	Credit (ft)	Cumulative Total (ft)	Riparian Width (ft)		Riparian Area (Acres)
							Left ^e	Right ^e	
10	1500	1890	Restoration	1.5:1	1000	1000			
10	1500	1890	Replacement ^d	1:1	390	1390	50	50	3.8
5	1705	1935	Restoration	1.5:1	1135	2525			
5	1705	1935	Replacement ^d	1:1	230	2755	50	50	4.3
27	1030	1230	Restoration	1.5:1	820	3575			
27	1030	1230	Replacement ^d	1:1	200	3775	50	50	2.7
6	1630	1630	Enhancement	4:1	405	4180	50	50	3.7
9	1270	1270	Enhancement	4:1	320	4500	50	50	2.8
Total Acreage of Riparian Buffer Provided:									17.3

- a) See Appendix I for Stream Mitigation plans.
- b) The existing length to be mitigated is the portion of the existing stream on which the mitigation will be performed.
- c) The restored and/or enhanced stream length is the length of stream following the mitigation activity.
- d) The difference in the existing mitigated length of stream and the length of stream that will exist following the mitigation activity will be considered stream replacement and will be credited at a 1:1 ratio.
- e) Riparian width left/right orientation is based on a downstream view of the stream section.

B. Proposed Mitigation Types

Riparian Buffer

The purpose of the riparian buffer is to intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. Woody vegetation in buffers provides food and cover for wildlife, helps lower water temperatures by shading the stream, and slows out-of-bank flood flows. In addition, the vegetation closest to the stream provides litter fall and large wood important to fish and other aquatic organisms as a nutrient source and structural components to increase channel roughness and habitat complexity. Also, the woody roots increase the resistance of stream banks to erosion caused by high water flows.

A riparian buffer typically includes 3 zones (see figure 1 below). Zone 1 is the area closest to the stream, and zone 2 is the area adjacent to up gradient of zone 1. Trees and shrubs in zone 1 provide important wildlife habitat, litter fall for aquatic organisms, large wood that can fall into the stream, and shading to lower water temperature. This zone also helps stabilize stream banks. Trees and shrubs in zone 2 (along with zone 1) intercept sediment, nutrients, pesticides, and other pollutants in surface and subsurface water flows. A third zone, zone 3, is established if periodic and excessive water flows, erosion, and sediment from upslope fields or tracts are anticipated. Zone 3 generally, consists of herbaceous plants or grass and a diversion or terrace, if needed. This zone provides a "first line of defense" to assure proper functioning of zones 1 and 2.

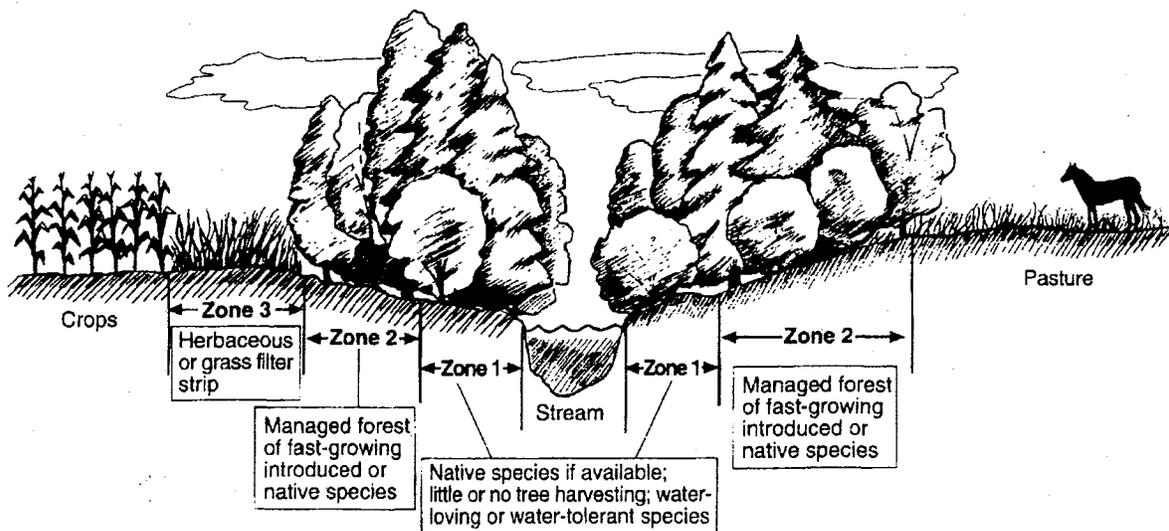


Figure 1. Typical Riparian Buffer Zone layout.

The riparian buffer as indicated in Table 2 for stream sections 10, 5, 27, 6 and 9 will combine 50 feet of trees, shrubs, and grasses planted next to the stream, requiring approximately 12 acres of land per stream mile (providing 50 feet of riparian buffer beyond bank-full on both sides of the stream). The proposed riparian buffers shall consist of:

- a) **Zone 1 - Streamside Zone:** (20 feet) 2 or 3 tree and/or shrub rows (measured from the top of the stream bank). Zone 1 shall protect the stream bank, slow floodwaters, and take up nutrients. Proposed Plantings: Yellow Poplar, Cherry Bark Oak, Nutall Oak, and Water Oak (spacing: 10'x10').
- b) **Zone 2 - Middle Zone:** (30 feet) 3 or 4 tree and/or shrub rows. Zone 2 will simply be an extension of zone 1 in order to provide the minimum riparian buffer of 50 feet in accordance with the Tennessee Stream Mitigation Guidelines. Proposed Plantings: Yellow Poplar, Cherry Bark Oak, Nutall Oak, and Water Oak (spacing: 10'x10').
- c) **Zone 3 (Optional) - Near Field Grass Zone:** (10 to 20 feet) grass strip. Grasses are most effective at trapping eroded soils in runoff. Zone 3 will be optional and will be an extension of the 50-ft woody zone combined in Zones 1 and 2. Proposed plantings: Bicolor Lespedeza and Switchgrass (See Appendix F).

Stream Restoration

Stream Restoration is defined as the process of returning a significantly degraded, disturbed, or totally altered stream, including adjacent riparian zone and flood-prone area, to a natural stable condition. Restoration typically includes rebuilding the appropriate channel pattern, profile, dimensions, and riparian zone based on reference reach conditions.

Stream sections 10, 5 and 27 will be restored in accordance with guidelines established by the Tennessee Stream Mitigation Review Team (TSMRT), and as indicated within the conceptual drawings located in Appendix I. The angle of graded slopes and fills will not be too steep to support vegetative cover. Slopes will be provided with ground cover within 15 working days or 30 calendar days of completion of any phase of restoration activity. The restoration process will minimize the extent and duration of disruption of the existing stream channels. Where relocation of the stream forms an essential part of the proposed activity, the relocation shall minimize unnecessary changes in the stream flow characteristics.

Minimizing the extent and duration of disruption of the stream channel during restoration will be a guiding principal in the sedimentation and

erosion control plan. New channel segments will be constructed and stabilized before flow is diverted into the new channel. Where reshaping and repair of stream banks occurs in an existing channel, flow will be temporarily pumped around the work area if practical. When work must occur in a flowing stream, stabilization of the channel will progress concurrently with the bank disturbance. Each day's work will be a completed work, with all regraded stream banks provided with at least temporary ground cover. Any excavated soil will be removed directly to a protected stockpile area, without double handling of the material in the stream area. A gravel construction entrance, temporary equipment crossings, temporary diversions, rock silt screens and sediment traps, and silt fence, are typical controls that will be utilized, and will be discussed in detail within the Erosion Control Plan.

The restoration process within the indicated stream sections will involve the reestablishment of a natural meander along existing stream sections and the reshaping of the channel cross-section as indicated on the plans. The profile of the stream shall follow the existing profile without major disruption in flow. Stabilization techniques shall be provided in accordance with the recommendations mentioned above.



Figure 2. Reference Reach conditions along Stream Section 10.

Figure 2 is a picture taken during the actual survey of stream section 10. The proposed design meanders for the restoration of stream

sections 5, 6, and 27 are based on the existing natural conditions as indicated in Figure 2 above. The natural meander wavelength for the reference reaches were measured to be approximately 12 to 20 times the bottom channel width with a radius of curvature of approximately 2 to 3 times the bottom channel width. Proposed meanders will be constructed in a non-uniform manner, varying the meander wavelength and radius of curvature within the ranges indicated. The newly constructed and restored streams will follow the general horizontal alignment and vertical profile of the reference stream conditions as indicated on the plans. Figure 3 below also indicates a typical grade control structure at the transition from a riffle/pool section, in which a log has been implanted within the streambed. This type of in-stream habitat and grade control structure will be used during the proposed stream restoration process (see Sheet M2 of the Mitigation Plans located in Appendix I).



Figure 3. Reference Reach conditions along Stream Section 27.

C. Planned Vegetation

The specified plant species that follow are generally available from local nursery stock, but some native substitutions may be allowed if the existing soil conditions will support such species. The list provided

below is simply for reference and the planted species will depend on availability during the time of planting. Nevertheless, no single species shall comprise more than 1/3 of the total planted trees, and seedlings/trees must be guaranteed at a 75% survivorship for the duration of the required monitoring period.

Table 3. Recommended Native Tree Species for Stream Restoration

Common Name	Scientific Name	Spacing	Planting Dates
Water oak	<i>Quercus nigra</i>	10'x10'	Nov 1 – Apr 1
Willow oak	<i>Quercus phellos</i>	10'x10'	Nov 1 – Apr 1
Nuttall Oak	<i>Quercus nuttallii</i>	10'x10'	Nov 1 – Apr 1
Yellow Poplar	<i>Liriodendron tulipifera</i>	10'x10'	Nov 1 – Apr 1
Cherrybark oak	<i>Quercus pagoda</i>	10'x10'	Nov 1 – Apr 1

Table 4. Recommended Native Shrub Species for Stream Restoration

Common Name	Botanical Name	Spacing	Planting Dates
Silky dogwood	<i>Cornus amomum</i>	8'x8'	Nov 1 – Apr 1
Crab Apple	<i>Malus sylvestris</i>	8'x8'	Nov 1 – Apr 1
Wild Plum	<i>Prunus domestica</i>	8'x8'	Nov 1 – Apr 1
Indigobush	<i>Amorpha fruticosa</i>	8'x8'	Nov 1 – Apr 1
Spicebush	<i>Lindera benzoin</i>	8'x8'	Nov 1 – Apr 1
MapleLeaf Viburnum	<i>Viburnum acerifolium</i>	8'x8'	Nov 1 – Apr 1
Elderberry	<i>Sambucus canadensis</i>	8'x8'	Nov 1 – Apr 1

All tree and shrub species (Zones 1 and 2) are proposed to be planted in early spring of 2006. The optional 20-ft grass filter strip (Zone 3) will be planted during the following growing season, if incorporated. Thus, the first annual monitoring report will be submitted no later than April 1, 2007.

4. Monitoring Plan

A. General

The mitigation activity will be monitored for success to evaluate the effectiveness of the restoration effort in reestablishing

natural/estimated water quality and biological conditions. A stream restoration monitoring plan will be used to evaluate the construction and installation of structural and vegetative components of the restoration and riparian enhancement activity. This monitoring plan will use qualitative measures to evaluate the structural, wildlife, and herbaceous components and quantitative measurements for aquatic biota and woody vegetation survival.

According to the Stream Mitigation Guidelines for the State of Tennessee, the type of mitigation treatment determines the type of monitoring required. The first monitoring report will be submitted at the beginning of the first growing season after completion of the mitigation project and will be submitted annually for a period of 3 to 5 years for the Enhancement I and Restoration activity.

As indicated in the guidelines, Enhancement I mitigation treatment requires Level II Monitoring, whereas Restoration requires Level III Monitoring. Both Level II and III require annual reports to be submitted over a period of 5 years.

Monitoring reports will include a narrative description and photos accurately depicting the stream and riparian habitat. Monitoring requirements also include habitat assessments to document pre- and post-project habitat conditions. Annual riparian vegetation surveys documenting the survivorship of planted riparian species will be performed for all mitigation activity that include riparian enhancement. Monitoring reports for restoration activity will include annual surveys of channel morphology (pattern, profile, and dimension).

B. Monitoring Requirements

As-built Survey of all mitigation activity will be performed following construction so that the appropriate descriptions for the conservation easements can be prepared. The as-built survey will also assist in setting up permanent monitoring stations throughout the length of restored sections. These monitoring stations will be established every 400 to 500 feet along the stream meander. Monitoring reports for restoration projects will include annual surveys of channel morphology (pattern, profile, and dimension).

Permanent Picture Stations will be established where pictures can be taken biannually (summer/winter). Photographic documentation of the success of the project will be provided with each monitoring report, regardless of the mitigation treatment.

Vegetative Monitoring of the riparian zone will be provided annually. The following success measurements will be reported:

- Species composition (include density and percent cover)
- Percent survival of planted trees and shrubs
- Stems/acre trees and shrubs (planted, & planted + volunteers)

C. Stream Morphology Monitoring

A stable stream channel transports the flows and sediment of its watershed while maintaining its dimension, pattern, and profile over time without aggrading or degrading. Monitoring the physical structure and form, or morphology, of the channel will be essential for evaluating stream stability, and will utilize:

- Channel cross-sections
- Longitudinal profiles
- Stream bank profiles

Cross-sections will be used to measure channel dimension (essential for stream classification) and to evaluate the vertical and lateral stability of a channel. Cross-sections will be carefully surveyed to identify channel features such as thalweg, water surface, inner berm, bankfull stage, top of bank, and other flood plain and terrace features. Longitudinal profiles are used to measure channel profile characteristics including depth, slope, length, and spacing of features such as riffles and pools. Stream bank profiles will be used to measure lateral stability of eroding banks.

D. Habitat Assessment

A pre-project habitat assessment (see Appendix G) will be completed to document existing conditions within the degraded stream segments. A second post-project habitat assessment will be completed at the end of the 5-year monitoring period, and a comparison of the two assessments will help in quantifying the ecological gain of the mitigation project.

E. Assessment Methods

Routine inspections of the restoration site will be conducted during construction to evaluate stream bank stabilization, planting methods, condition of planted material, erosion control measures, compliance with design plans, and progress. These inspections are qualitative in nature, commenting on the condition and progress of the restoration. Additionally, comprehensive inspections will be conducted on a quarterly basis for the first year and twice annually for the next four

years following construction to accurately evaluate the effectiveness of the stream restoration projects. The purpose of the inspections is to project stabilization practices and to evaluate erosion, bank failure, bare areas, bank sloughing, undermining, rill formation, settling, percent vegetation establishment, material integrity, sediment deposition, and maintenance needs. The stability and effectiveness of the restorations will be evaluated under low- and high-flow conditions. At least one inspection during and after high-flow conditions will be conducted. Overall structural conditions will be evaluated and included in the monitoring report.

Stream bank vegetative protection monitoring will measure the amount of vegetative protection provided to the stream bank and the near-stream portion of the riparian zone. This parameter provides information as to the bank's ability to resist erosion as well as control stream scouring and shading within the stream.

Photographic documentation will be conducted from permanent stations during each site visit to record wildlife use of the sites based on coverage of the restored habitats, inclusion of structural components, and aesthetic evolution.

Annual reports for a period of five years will be generated for the permitting agencies. These reports will include information such as condition of streams, surface and groundwater levels, survival rate of planted species, natural recruitment of species, and natural development of a ground cover stratum in respect to hydrological periods. As indicated previously, the first annual report will be scheduled on or before April 1, 2007.

F. Success Criteria

Success Criteria may be defined as easily measurable, external attributes that are established prior to the development of a mitigation site, and subsequently, will be exhibited by the site indicating that the specific mitigation goals have been met. Success Criteria is related to the specific target functions that must be replaced. The criteria should be specific, measurable, attainable, reasonable and traceable. For the proposed stream mitigation activities, they will be addressed in terms of the maintenance of a specific pattern, profile, and dimension.

A successful stream mitigation project will result in a stable channel capable of transporting the sediment and flow produced by the stream's watershed in such a manner that stream dimension, pattern, and profile are maintained without degrading. A stable channel would typically include intact riparian zones and variable habitat niches (i.e., coarse woody debris, riffles, pools, etc.).

Success shall be monitored in accordance with the requirements outlined previously.

5. Site Protection

All streams sections associated with the compensatory mitigation project will be protected in perpetuity, and the Conservation Easement will be the preservation mechanism. A "Model Conservation Easement" is located in Appendix H and will be used as a guide in preparing the final recorded conservation easement. The final recorded document should effectively restrict harmful activities that might otherwise jeopardize the purpose and functioning of the mitigation project. These prohibitions include, but are not limited to: filling; grading; excavating; earth movement of any kind; construction of roads, walkways, buildings, signs, or any other structure; any activity that may alter the drainage patterns on the property; the destruction, mowing, or other alteration of vegetation on the property; disposal or storage of any garbage, trash, or other waste material; or any other activity which would result in the streams being adversely impacted or destroyed.

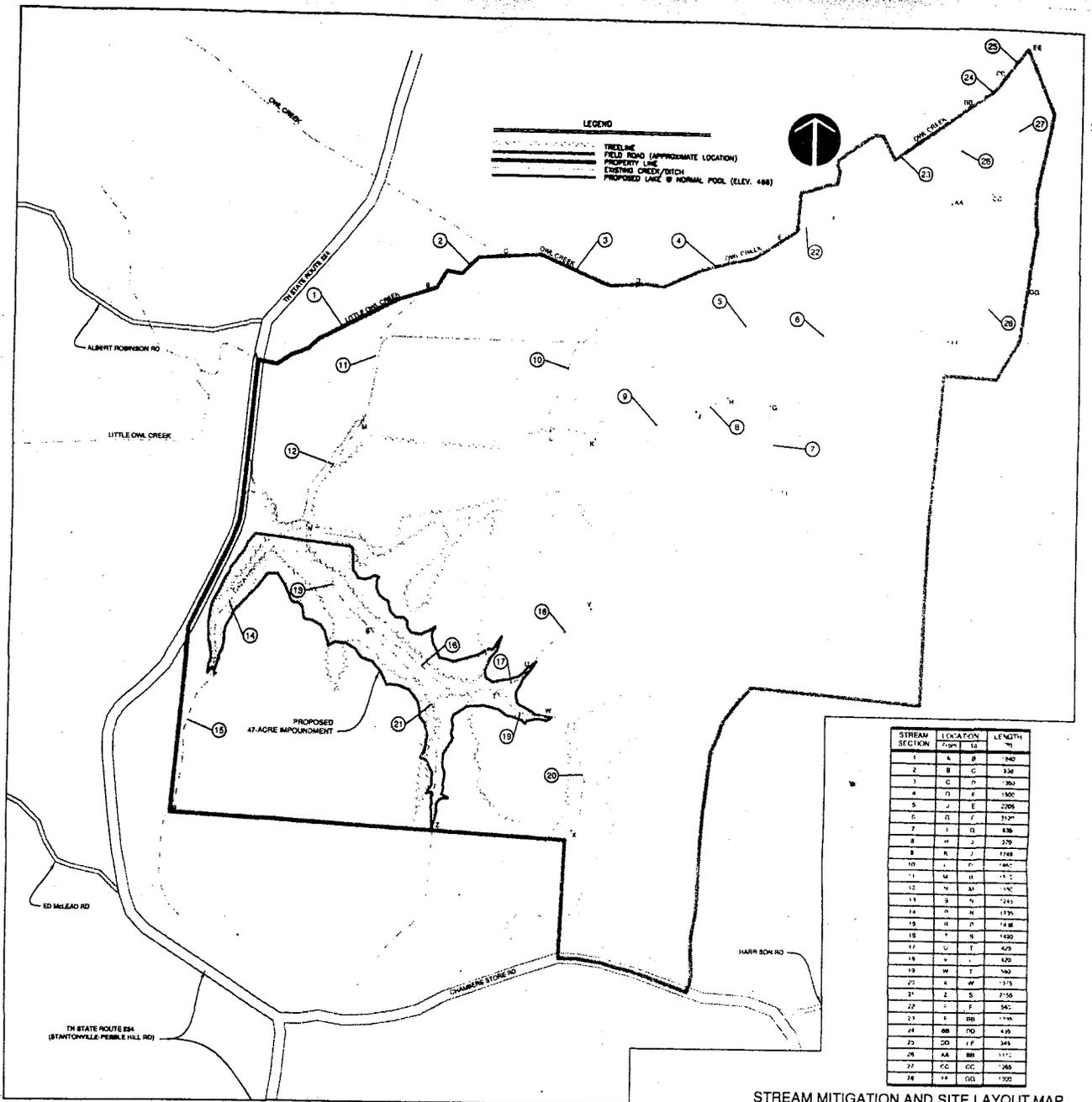
6. Proposed Methods for Maintaining Water Quality Standards Following Construction of the Dam

General Water Quality Criteria for Fish and Aquatic Life, provided by the TDEC Division of Water Pollution Control, will be adhered to in maintaining water quality standards. Typical water quality concerns and preventative measures include:

1. Temperature – Solar radiation will probably cause the surface layer of water in the proposed impoundment to have a higher temperature in the summer than the water in the existing intermittent stream. By properly designing the impoundment structure, cooler water that is more harmonious with the pre-impoundment conditions will be released into the receiving stream below the dam. This will be achieved by the dam's ability to intake from the emergency drawdown facility. The temperature of the water leaving the impoundment and entering the stream will not exceed 30.5°C and the maximum rate of change shall not exceed 2°C per hour.

2. Nutrients – The source of nutrients available for transmission into the receiving stream will not change because the land use will remain the same. No action is anticipated to be necessary to maintain the current level of nutrients in the water after the impoundment is in place. Nevertheless, the waters shall not contain nutrients in concentrations that stimulate aquatic plant and/or algae growth to the extent that aquatic habitat is substantially reduced and/or the biological integrity fails to meet regional goals. Additionally, the quality of downstream waters will not be detrimentally affected, as a result of the impoundment.
3. Metal concentration – The source of metals and their associated ions available for transmission into the receiving stream will not change because the land use will remain the same. No action is anticipated to be necessary to maintain the current level of metals and metal ions in the water after the impoundment is in place.
4. pH – The source of any factors affecting pH of the waters transmitted into the receiving stream will not change because the land use will remain the same. No action is anticipated to be necessary to maintain the current pH of the water after the impoundment is in place.
5. Conductivity – The conductivity, as well as metal concentration and pH, will not change because the land use within the drainage basin will remain the same. No action is anticipated to be necessary to maintain the current level of conductivity in the water after the impoundment is in place.
6. Dissolved Oxygen – The dissolved oxygen in the sub-surface layer of the impoundment, from which the water will be discharged to the receiving stream (see 1., above), is anticipated to be less than that of the flowing intermittent stream before impoundment. Wind action and gas transfer will cause re-aeration of the surface layer in the impoundment up to dissolved oxygen levels similar to the small stream. The deeper layers would not re-aerate to the desired concentration during hot days of little wind action. However, re-aeration of the outflow water will be accomplished by means of baffles and turbulence within the vertical section of the primary spillway. In addition, the energy-dissipating basin located at the outfall of the emergency drawdown pipe and the principle spillway outlet pipe will help re-aerate the discharged water from the impoundment. The dissolved oxygen will not be less than 5.0 mg/l when measured downstream of the impoundment.

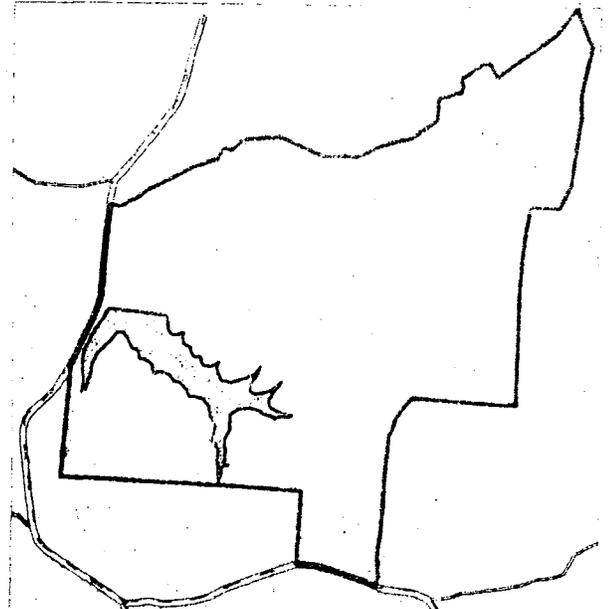
7. Base Flow Maintenance – Since data regarding a base flow assessment is not available for the impounded streams, an assumed year-round base flow of 0.25 cfs will be maintained following construction. However, beginning November 1, 2005, bimonthly flow measurements will be taken at the convergence of the two intermittent streams to be impounded. This will be performed throughout construction of the dam, so as to determine a seasonal base flow. Adjustments in the amount of flow to be maintained will be performed under direction of the permitting agencies.



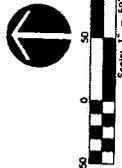
STREAM MITIGATION AND SITE LAYOUT MAP
SCALE: 1" = 500'



SOIL SURVEY MAP - MCNAIRY CO, TN
SCALE: 1" = 1000'



USGS QUAD MAP - MICHIE, TN
SCALE: 1" = 1000'



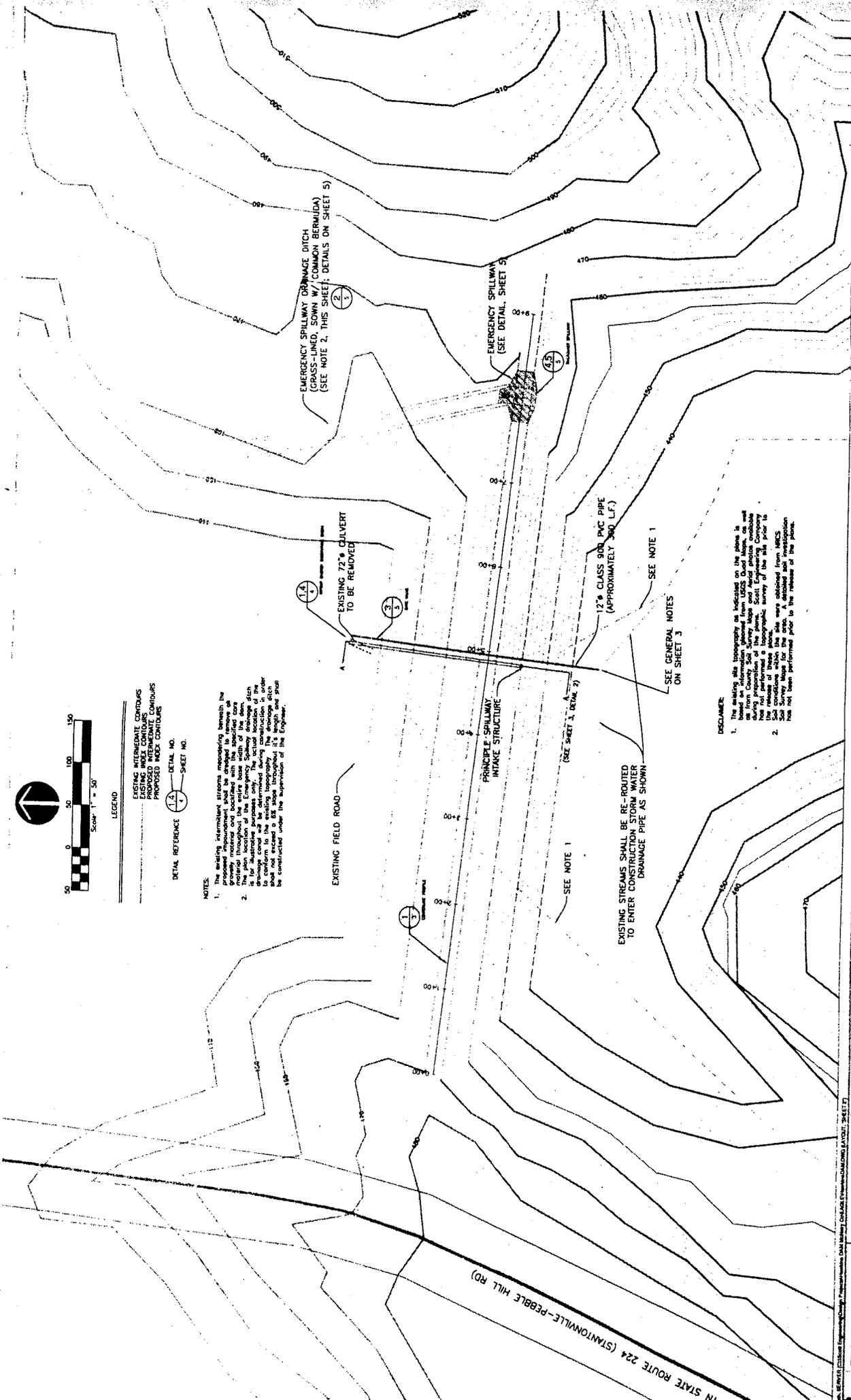
LEGEND

- EXISTING INTERMEDIATE CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- PROPOSED INTERMEDIATE CONTOURS

DETAIL REFERENCE (A) - DETAIL NO. SHEET NO.

NOTES

1. Existing intermediate contours representing the proposed improvement shall be shown as dashed lines and located with the specified contour interval.
2. The plan location of the proposed intermediate contours is for illustrative purposes only. The actual location of the contours shall be determined by the engineer in order to conform to the existing topography. The contours shall not extend a distance through the length and shall be constructed under the supervision of the Engineer.



EXISTING 72" CULVERT TO BE REMOVED

EXISTING STREAMS SHALL BE RE-ROUTED TO ENTER CONSTRUCTION STORM WATER DRAINAGE PIPE AS SHOWN

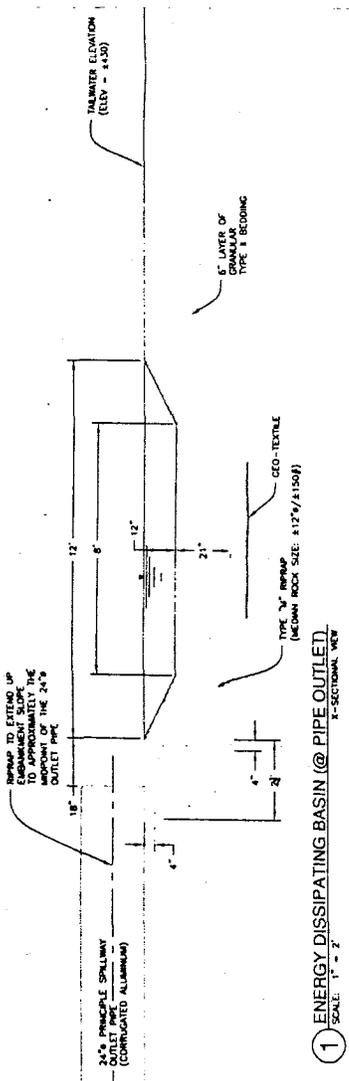
SEE GENERAL NOTES ON SHEET 3

SEE NOTE 1

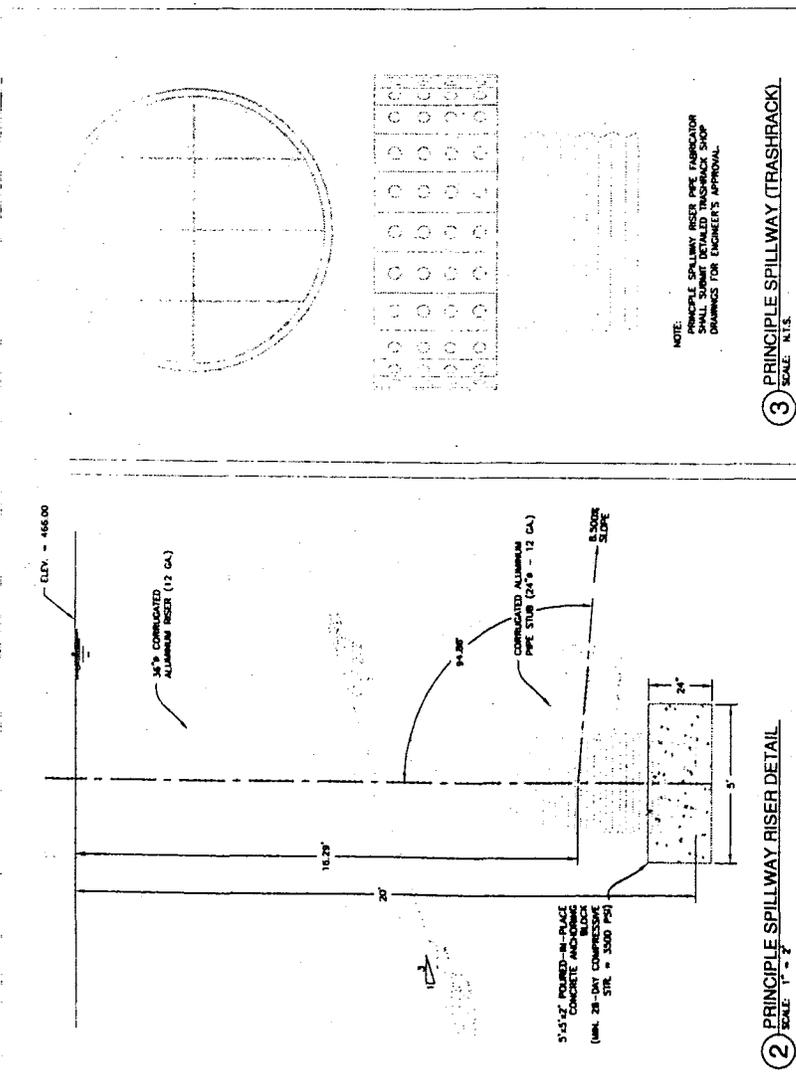
12" CLASS 900 PVC PIPE (APPROXIMATELY 300 L.F.)

DISCLAIMER

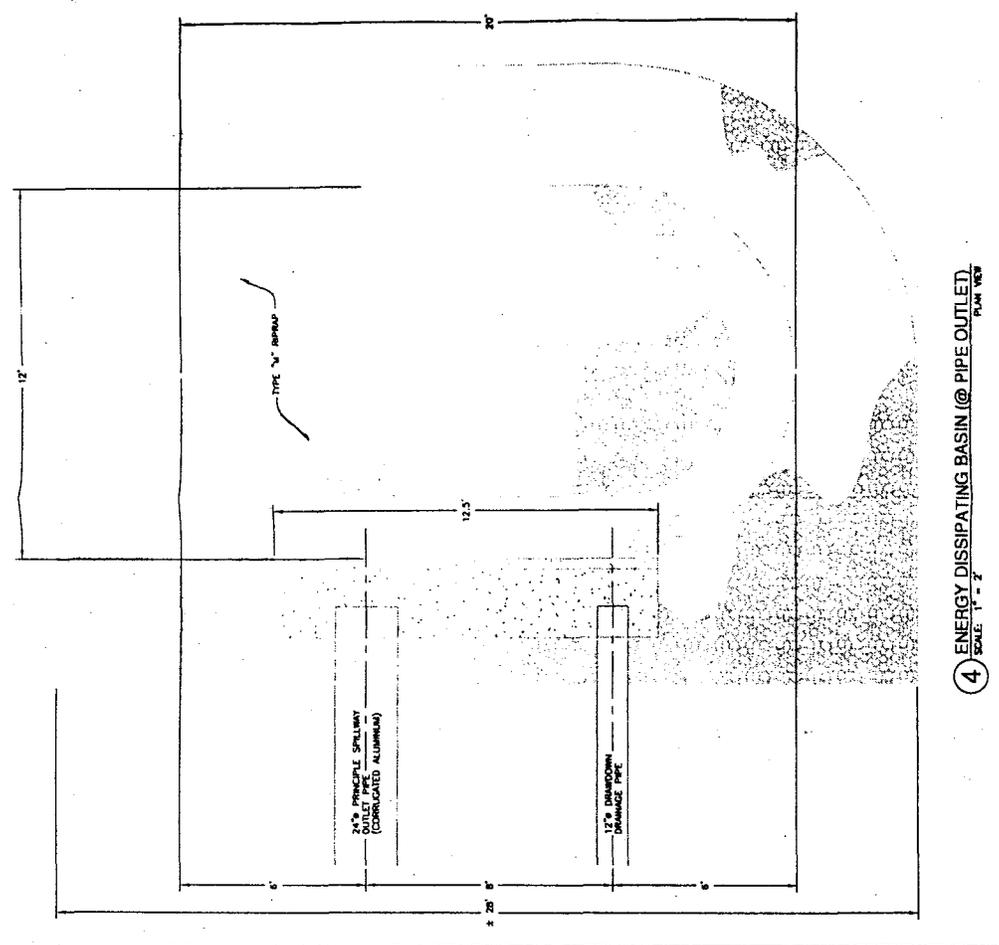
1. The existing site topography as indicated on this sheet is based on information obtained from USGS Quad maps, as well as other sources. It is not intended to be used for any purpose other than that for which it was prepared. The engineer has not performed a topographic survey of the site prior to the preparation of this sheet. The engineer is not responsible for any errors or omissions in the information shown on this sheet which may have been obtained from other sources.
2. The engineer has not been performed prior to the release of this plan.



1 ENERGY DISSIPATING BASIN (@ PIPE OUTLET)
SCALE: 1" = 2'



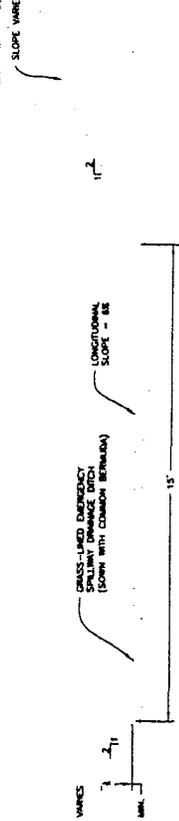
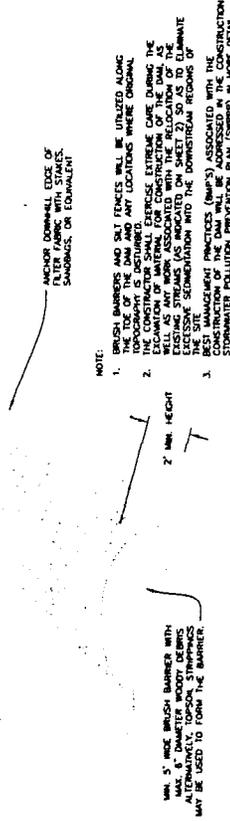
2 PRINCIPLE SPILLWAY RISER DETAIL
SCALE: 1" = 2'



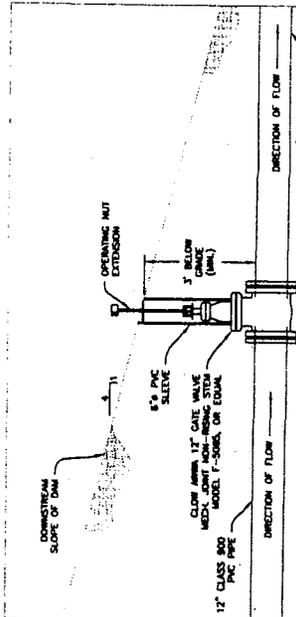
4 ENERGY DISSIPATING BASIN (@ PIPE OUTLET)
SCALE: 1" = 2'

1 BRUSH BARRIER DETAIL
SCALE: N.T.S.

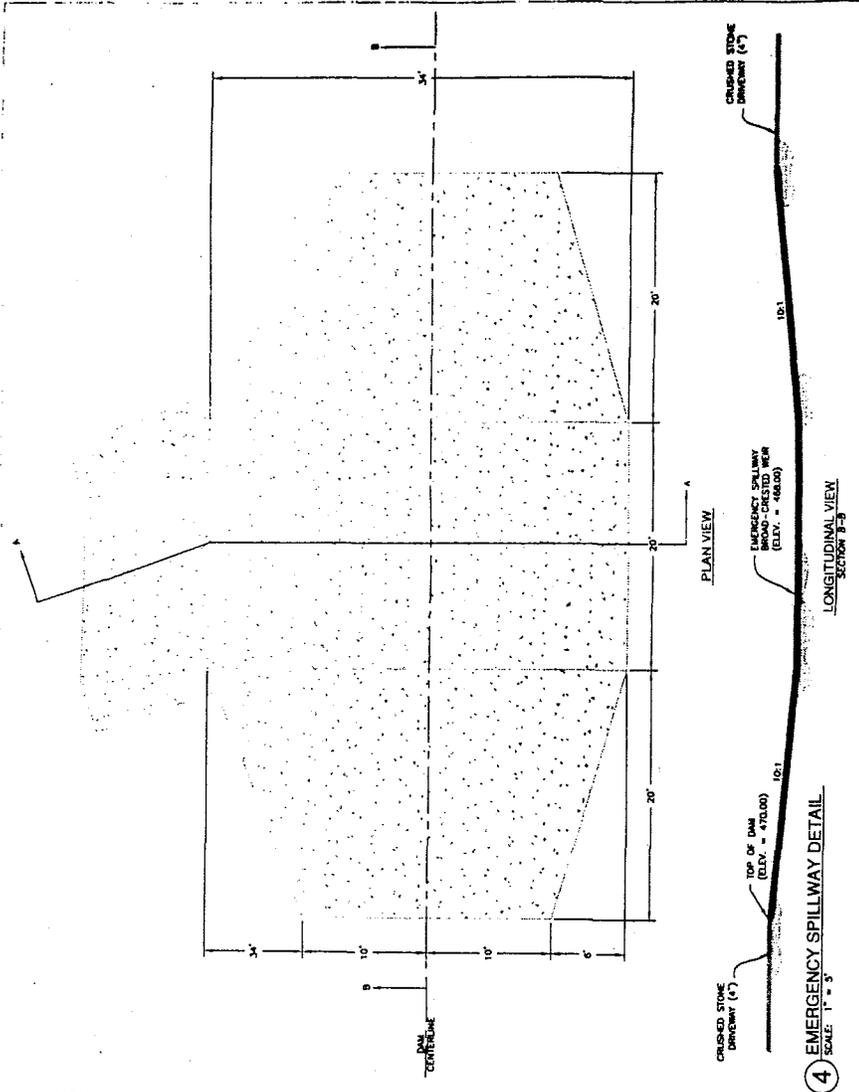
IF REQUIRED, MAKE FILTER FABRIC OVER BRUSH AND SECURE IN 4" x 4" MIN. TRENCH WITH COMPACTED BACKFILL



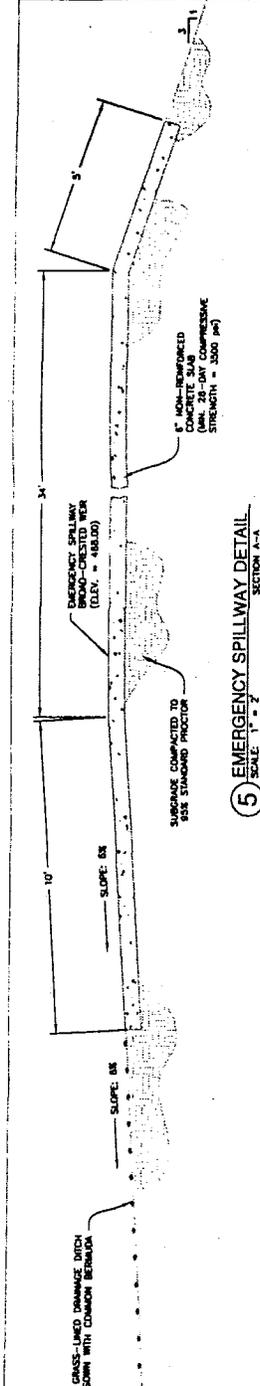
2 GRASS-LINED DRAINAGE DITCH
SCALE: N.T.S.



3 GATE VALVE (CONSTRUCTION STORMWATER DRAINAGE PIPE)
SCALE: N.T.S.



4 EMERGENCY SPILLWAY DETAIL
SCALE: 1" = 3'



5 EMERGENCY SPILLWAY DETAIL
SCALE: 1" = 2'

APPENDIX B

***Application for Certificate of Approval to the Safe Dams Division
of the TDEC***



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
 Division of Water Supply
 6th Floor, L & C Tower
 401 Church Street
 Nashville, TN 37243-1549

APPLICATION FOR CERTIFICATE OF APPROVAL AND SAFETY UNDER THE SAFE DAMS ACT OF 1973

Application is hereby made to: _____ construct _____ Hawkins _____ Dam
(operate, construct, alter, remove) (name)

in _____ McNairy _____ County, Tennessee. I.D. No. _____

Name of Owner _____ Mr. Bill Hawkins _____ Telephone (901) 743-5120 (office)
(individual, city, corporation, or other official name) (901) 848-6584 (cell)

Address of Owner _____ 3405 Pearson Road _____
 _____ Memphis, TN 38118 _____

Mailing Address _____ Same as Above _____

Note: All other owners must be listed on Page 2.

DESCRIPTION OF DAM AND RESERVOIR

Maximum Height: _____ 32 _____ ft. Crest Length: _____ 850 _____ ft. Crest width: _____ 20 _____ ft.
 Drainage Area: _____ 500 _____ acres (_____ 0.78 _____ square miles)

	Normal Pool	Emergency Spillway	Top of Dam
Reservoir Surface Area (acres):	47	51	55
Reservoir Storage (acre-feet):	697	794	899

Location: Attach portion of USGS topographic map showing location of dam, reservoir surface area, complete watershed area, and property boundaries of owners.

USGS Map No. _____ 13-SW _____ Dam center line: Latitude _____ 35 _____ ° _____ 06 _____ , _____ 42.8 _____ " _____
 Longitude _____ 88 _____ ° _____ 25 _____ , _____ 31.5 _____ "

Date _____ 8/25/04 _____ Signed _____
Owner or Official Directly Responsible

R.A. Scott IV
Type or Print Signature

Registered Professional Engineer (TN No. 107159)
Type or Print Title

*** FOR OFFICE USE ONLY ***

Application No. _____ Date Received _____
 Fee Receipt No. _____ Date Received _____

APPLICATION TO CONSTRUCT A NEW DAM

Unless specifically exempted, an engineering report and detailed plans and specifications must be submitted as part of this application. Preparation of the plans and specifications and supervision of construction must be under the direction of a qualified registered engineer eligible to practice in the State of Tennessee. Upon completion of the project, the engineer who supervised the construction must certify in writing that the construction conformed to the approved plans and specifications.

Design Engineer R.A. Scott, IV, P.E., P.L.S.
 Address 1530 Polk Street
Corinth, MS 38834
 Telephone (662) 287-2436

Engineer To Oversee Construction R.A. Scott, IV, P.E., P.L.S.
 Address 1530 Polk Street
Corinth, MS 38834
 Telephone (662) 287-2436

A project review fee is required for all new dam construction. The fee must be paid by check or money order payable to the State of Tennessee.

SCHEDULE OF SAFE DAMS PLANS REVIEW FEES

<u>Height of Dam (feet)</u>	<u>Charge</u>
6 to 40	\$1000
41 to 60	\$1500
61 and above	\$2000

AMOUNT SUBMITTED \$ Fee waived

APPENDIX C

***Letter to Safe Dams Division concerning the intended use of the
Impoundment***

SCOTT ENGINEERING COMPANY

1530 POLK STREET - HIGHWAY 45 NORTH - CORINTH, MS 38834 - (662) 287-2436

September 22, 2004

Mr. Corey Patrick
Safe Dams Section
Jackson Environmental Assistance Center
Tennessee Department of Environment and Conservation
362 Carriage House Drive
Jackson, TN 38305-2222

RE: Proposed Hawkins Lake
Highway 224, McNairy County

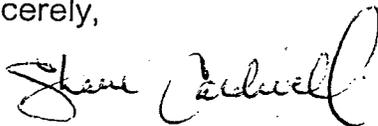
Dear Mr. Patrick,

In accordance with your request during our telephone conversation on September 21, 2004, I am sending this letter on Mr. Hawkins' behalf regarding the intended use of the above-referenced lake. According to Mr. Hawkins, the lake is being built for family recreation. The 864-acre tract of land that the lake is to be built upon is privately owned by Mr. Hawkins, and once the lake is built, it will remain completely closed to the public.

As you indicated in your letter to Mr. Hawkins dated August 4, 2004, the lake will not be regulated by the State of Tennessee, due to its intended use as strictly private. However, Mr. Hawkins intends on complying with the rules and regulations provided by the Safe Dams Section of the Division of Water Supply regarding dam design and construction. As the Engineer of record for the project, Scott Engineering Company would appreciate your recommendations and comments regarding our proposed dam design. Once our construction plans are finalized, we would like to forward a copy to you for your review. Also, as requested in your August 4, 2004 letter, you will be contacted once the dam is constructed so that the dam may be placed within your inventory and assigned a Hazard Potential Classification.

Thank you for your help and cooperation regarding this project. Should you have any questions or comments, please do not hesitate to call. I will keep you posted on our progress as we move toward receiving the required permits prior to commencement of construction.

Sincerely,



Shane Cardwell, E.I.

MSC:sc

CC: Mr. Bill Hawkins
File

APPENDIX D

Gregg Overstreet letter dated August 27, 2004

AUG 30 2004



ENVIRONMENTAL ASSISTANCE CENTER
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
362 CARRIAGE HOUSE DRIVE
JACKSON, TENNESSEE 38305-2222
PHONE (731) 512-1300 STATEWIDE 1-888-891-8332 FAX (731) 661-6283

August 27, 2004

Mr. Shane Cardwell
Scott Engineering Company
1530 Polk Street
Corinth, MS 38834

Re: Proposed Hawkins Lake
Highway 224, McNairy County

Dear Mr. Cardwell:

It was a pleasure to meet with you to discuss and inspect the proposed 47 acre lake Mr. Hawkins wishes to construct on two unnamed tributaries of Little Owl Creek in McNairy County. During my site visit I performed a stream/wet weather conveyance determination on the two tributaries that would be impacted by the proposed impoundment.

The primary channel to be impounded has a gravel bottom and is approximately six to seven feet deep and seven to ten feet wide. The smaller tributary flowing closer to the highway also has a gravel bottom and is approximately five to six feet deep and three to six feet wide. Flow was present in both channels during my inspection. The "Soil Survey of McNairy County, Tennessee" maps the soil in the area of the impoundment as luka fine sandy loam, occasionally flooded. This soil type possesses a seasonal high water within one to three feet of the surface in the winter and spring. Benthic sampling revealed the presence of aquatic macroinvertebrates with extended aquatic life cycles in both channels. They included the families Elmidae (riffle beetles), Heptageniidae and Caenidae (mayflies), Hydropsychidae (caddisflies) and Chronomidae (midges). In addition, several fish species were observed in both channels.

Based upon the soil type, flow in both channels, and the presence of fish and aquatic macroinvertebrates with extended life cycles both channels have been determined to be streams for the entire length of the proposed impoundment. Consequently, any alteration to these streams, including but not limited to impoundments, will require the issuance of an Aquatic Resource Alteration Permit (ARAP).

As we discussed on site, an individual ARAP would be required for this project. The application fee for an individual landowner is fifty dollars (\$50). Further requirements of an individual ARAP include a 30-day public notice period and stream mitigation for every linear foot of stream to be impounded by the project. It appears, based upon the map provided me and the elevation desired for normal pool, that a minimum of 5,000 linear feet of stream would be impounded.

Mr. Shane Cardwell
August 27, 2004
Page 2

Stream mitigation may be performed in a number of different ways. They include, but are not limited to, restoration of previously channelized streams, stabilization of eroding banks, re-establishment of riparian buffer zones, construction of in-stream habitat, livestock exclusion, removal of non-point source pollutants, and reversal of adverse hydrological modifications. A document titled "Stream Mitigation Guidelines for the State of Tennessee" is available on our website for more information.

In addition, the discharge from the spillway will have to meet water quality standards. As I mentioned on site, increased temperature, nutrient and metal concentrations, pH, conductivity, and dissolved oxygen levels often degrade downstream water quality. Therefore, any application submitted would need to address how water quality standards would continue to be met.

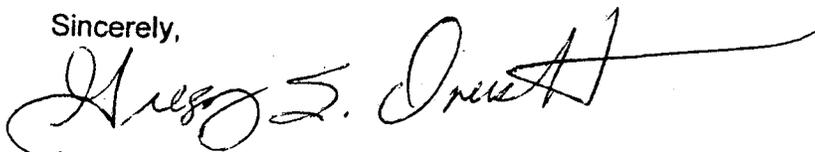
As we discussed, stream mitigation often is the limiting factor in projects of this type either because of a lack of additional stream length available or due to the additional cost of mitigation. Due to the mitigation requirements and the requirement that downstream water quality standards must continue to be met it has become more difficult to obtain permits for projects of this nature. Please do not take that as meaning a permit could not be obtained, but rather as a caution as to the level of design and information required, potential cost, and time required to obtain a permit.

Should Mr. Hawkins wish to proceed with this project, a complete ARAP application should be sent to the Natural Resources Section with payment and a copy of the application sent to the Jackson Environmental Assistance Center. The application should include a set of detailed plans for the impoundment including how the discharge will meet water quality standards and the required stream mitigation plan. In general, an individual permit takes a minimum of 90 days to process provided the application is complete and no additional information is required.

Finally, a Notice of Intent (NOI) for the Construction Storm Water General Permit would need to be submitted to the Jackson Environmental Assistance Center a minimum of thirty days before any construction activities begin at the site. The fee for this permit coverage is based upon the acreage disturbed and can be determined once an ARAP is obtained.

If you have any questions regarding the permit process, mitigation requirements or need additional assistance please feel free to contact me at (731)-512-1308.

Sincerely,



Gregory S. Overstreet, Biologist
Division of Water Pollution Control
Jackson Environmental Assistance Center

Cc: Corey Patrick, DWS/Safe Dams
JEAC

APPENDIX E

Gregg Overstreet letter dated June 1, 2005



~~MAY 03 2005~~

ENVIRONMENTAL ASSISTANCE CENTER
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
362 CARRIAGE HOUSE DRIVE
JACKSON, TENNESSEE 38305-2222
PHONE (731) 512-1300 STATEWIDE 1-888-891-8332 FAX (731) 661-6283

JUN 03 2005

June 1, 2005

Mr. Shane Cardwell
Scott Engineering Company
1530 Polk Street
Corinth, MS 38834

Re: Proposed Hawkins Lake
Highway 224, McNairy County

Dear Mr. Cardwell:

At your request a more complete wet weather conveyance/stream determination was performed on May 31, 2005 on the tributaries of Little Owl Creek that are proposed to be impounded by Mr. Hawkins to create a 47-acre lake.

In the individual Aquatic Resource Alteration Permit (ARAP) application submitted to the Division, a map was included in Appendix C showing the site layout and labeling the various stream segments to be impacted. For consistency I will refer to the stream sections as labeled on this map (attached) in making the stream/wet weather conveyance determinations.

Portions of two stream segments have been determined to be wet weather conveyances. The primary channel to be impounded forks approximately 1270 feet upstream of the proposed dam resulting in two channels continuing upstream. Stream section 21 continues upstream in a southerly direction. This channel was currently dry, however, the "Soil Survey of McNairy County, Tennessee" indicates the soil in the area to be luka fine sandy loam, occasionally flooded. This soil type possesses a seasonal high water table within one to three feet of the surface in the winter and spring. The channel through this stretch is approximately five to six feet deep and three to six feet wide. A change in soil type is noted in the soil survey approximately midway of stream section 21. Oktibbeha and Sumter soils are present in upper portion of stream section 21. This soil type possesses a seasonal high water table greater than six feet deep. Based upon the change in soil type and lack of flow the portion of stream section 21 upstream of N35.1080°, W88.4204° is a wet weather conveyance.

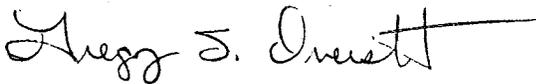
Stream section 17 also has been determined to be a wet weather conveyance. This section of channel was currently dry with the soil mapped as Oktibbeha and Sumter. Stream sections 16 and 19 also were evaluated and determined to be stream. Flow was present throughout these sections even with a prolonged dry period preceding this determination.

Mr. Shane Cardwell
June 1, 2005
Page 2

The two segments that have been determined to be wet weather conveyances will lessen the stream impacts by approximately 1,725 feet (425' of section 17, 1300' of upper portion of section 21). A more accurate length may be determined by any survey work that may have been performed.

If you have any questions regarding this determination or need additional assistance please feel free to contact me at (731)-512-1308.

Sincerely,



Gregory S. Overstreet, Environmental Specialist
Division of Water Pollution Control
Jackson Environmental Field Office

Cc: Amy Robinson-USACOE/Nashville
Robert Baker-DWPC/NRS
JEFO

APPENDIX F

NRCS Plant Fact Sheets (Switchgrass and Lespedeza)

SWITCHGRASS

Panicum virgatum L.

plant symbol = PAVI2

Contributed by: USDA NRCS Plant Materials Program



Robert Mohlenbrock
USDA NRCS 1991. Southern Wetland Flora
@USDA NRCS PLANTS

Uses

Livestock: Switchgrass is noted for its heavy growth during late spring and early summer. It provides good warm-season pasture and high quality hay for livestock.

Erosion Control: Switchgrass is perhaps our most valuable native grass on a wide range of sites. It is a valuable soil stabilization plant on strip-mine spoils, sand dunes, dikes, and other critical areas. It is also suitable for low windbreak plantings in truck crop fields.

Wildlife: Switchgrass provides excellent nesting and fall and winter cover for pheasants, quail, and rabbits. It holds up well in heavy snow (particularly 'Shelter' and 'Kanlow' cultivars) and is useful on shooting preserves. The seeds provide food for pheasants, quail, turkeys, doves, and songbirds.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Weediness

This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed. Please consult with your local NRCS Field Office, Cooperative Extension Service office, or state natural resource or agriculture department regarding its status and use. Weed information is also available from the PLANTS Web site at plants.usda.gov.

Description

Panicum virgatum L., switchgrass, is native to all of the United States except California and the Pacific Northwest. It is a perennial sod-forming grass that grows 3 to 5 feet tall and can be distinguished from other warm-season grasses, even when plants are young, by the white patch of hair at the point where the leaf attaches to the stem. The stem is round and usually has a reddish tint. The seed head is an open, spreading panicle.

Adaptation and Distributions

On suitable soils, switchgrass is climatically adapted throughout the most of the United States. Moderately deep to deep, somewhat dry to poorly drained, sandy to clay loam soils are best. It does poorly on heavy soils. In the East, it performs well on shallow and droughty soil.

Switchgrass is distributed throughout the majority of the United States, excluding the far west states. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Establishment

Switchgrass should be seeded in a pure stand when used for pasture or hay because it can be managed better alone than in a mixture. Its slick, free-flowing seed can be planted with most seed drills or with a broadcast spreader. In the Southeast, a planting rate of approximately 10 pounds PLS per acre is recommended. Seedbeds should be firmed with a roller prior to the drilling or broadcasting of seed. If seeds are planted using the broadcast method, the area should be rolled afterward to help cover the seed. When drilled, seeds should be planted 1/4 inch deep. No-tillage seedings in closely grazed or burned sod also have been successful, where control of sod is accomplished with clipping, grazing, or proper herbicides.

Phosphorus and potassium should be applied according to soil tests before or at seeding. Nitrogen,

however, should not be used at seeding time because it will stimulate weed growth.

Management

To control weeds during establishment, mow switchgrass to a height of 4 inches in May or 6 inches in June or July. Grazing is generally not recommended the first year, but a vigorous stand can be grazed late in the year if grazing periods are short with at least 30 days of rest provided between grazings. Switchgrass is the earliest maturing of the common native warm-season grasses and it is ready to graze in early summer.

Established stands of switchgrass may be fertilized in accordance with soil tests. Phosphorus and potassium may not be needed if the field is grazed since these elements will be recycled back to the soil by the grazing animal. Apply nitrogen after switchgrass has begun to produce using a single application in mid-to-late May or a split application in both May and early July. Avoid high rates of nitrogen because carry-over could spur cool-season grass growth and harm young plants the following spring.

Switchgrass will benefit from burning of plant residues just prior to initiation of spring growth. Burning fields once every 3 to 5 years decreases weed competition, eliminates excessive residue and stimulates switch grass growth. Switchgrass used for wildlife food and cover should be burned once every 3 to 4 years to reduce mulch accumulations that inhibit movement of hatchlings and attract nest predators.

Under continuous grazing management, begin grazing switchgrass after it has reached a height of 14 to 16 inches, and stop when plants are grazed to within 4 inches of the ground during late spring, 8 inches in early summer, and 12 inches in late summer. A rest before frost is needed to allow plants to store carbohydrates in the stem bases and crown. Plants may be grazed to a height of 6 to 8 inches after frost. The winter stubble is needed to provide insulation.

With management intensive systems, grazing can begin in the first paddocks when plants reach a height of 10 inches and should not be grazed below a stubble height of 6 to 8 inches. Grazed paddocks need to be rested 30-60 days before being grazed again.

Pests and Potential Problems

Grasshoppers and leafhoppers can be major pests in new seedings. Some stands are impacted by damping off and seedling blight. Leaf rust occasionally affects forage quality.

Cultivars, Improved, and Selected Materials (and area of origin)

'Alamo' (TX), 'Blackwell' (OK), 'Cave-In-Rock' (IL), 'Dacotah' (ND), 'Forestburg' (SD), 'Kanlow' (OK), 'Nebraska 28' (NE), 'Shawnee,' 'Shelter' (WV) (cultivars); Grenville (NM) (informal release); Miami (Dade Co, FL), Stuart (Stuart, FL), Wabasso (Wabasso, FL) (source identified releases). Seeds are available from most commercial sources and through large agricultural supply firms.

Control

Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA, NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

Prepared By & Species Coordinator: USDA NRCS Plant Materials Program

16Jan2001 JLK

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS (<http://plants.usda.gov>) and Plant Materials Program Web sites (<http://Plant-Materials-nrcs.usda.gov>).

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-726-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

BICOLOR LESPEDEZA

Lespedeza bicolor Turcz.
plant symbol = LEBI2

Contributed by: USDA NRCS Plant Materials
Program



USDA NRCS National Plant Materials Center
Beltsville, MD

Uses

Bicolor lespedeza was introduced primarily to provide legume food and cover to popular game animals. Target wildlife have included ringneck pheasants, bobwhite quail, cottontail rabbits, and whitetailed deer. Honeybees are also attracted to their pinkish to purple flowers which bloom in late summer when few other plants valuable to beekeepers are blooming. The masses of late summer blooms also make it a valuable landscaping plant for borders and hedges.

Bicolor lespedeza is best used as field borders and along woodlands, on spoilbanks resulting from ditching and in small odd areas devoted to wildlife habitat improvement. The value of this shrub lespedeza for wildlife improves when planted in conjunction with rows of switchgrass (*Panicum virgatum*).

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Weediness

This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed. Please consult with your local NRCS Field Office, Cooperative Extension Service office, or state natural resource or agriculture department regarding its status and use. Weed information is also available from the PLANTS Web site at plants.usda.gov.

Description

Bicolor lespedeza is a perennial semi-woody legume native to Japan. Allowed to grow naturally, it can reach a height of 8 to 10 feet with 1/2 inch diameter stems. If cut back, stems will grow 4 to 6 feet tall. The abundant trifoliate oval leaves are usually 1.5 inches long and 1 inch wide. The pink to purple colored flowers of 'Natob' appear first in late June to early July and continue for 4-6 weeks. *The outstanding quality of 'Natob' is that the seed matures at least a month earlier than common bicolor lespedeza.* Bees and insects are necessary to adequately pollinate lespedezas. The small, black, bean-like, seeds are singly produced in pods which open when mature. Seed maturity occurs from late September to early October. Some plants hold seed into the winter but most seeds fall by January. Approximately 300 to 500 pounds of seed is produced per acre. There are about 72,000 seeds per pound.

Adaptation and Distribution

Bicolor lespedeza performs well on droughty, well drained, or somewhat poorly drained soils of variable texture. This species does not tolerate poorly drained sites. For seed to fully mature, a growing season no less than 160 days long is required. 'Natob' is more winter-hardy than other bicolor and shrub lespedezas grown in the Northeast.

Establishment

'Natob' plantings can be established with 1 year old field-grown seedlings, but direct seeding is the preferred method. For seedlings to be effective, good site preparation is necessary. In mid spring a weed free, firm, seedbed must be well worked for good seed establishment. To insure first year germination, the seed should be first scarified by abrasion or acid. Prior to sowing, the seed must be inoculated with the proper rhizobial bacteria. Seeding should occur from the date of last expected frost to no later than June 1. If established with

broadcasting techniques, 8 to 10 pounds of seed per acre should be used on well-worked soils; if drilled into rows, 6 to 8 lbs./ac. will be acceptable rates. When co-planting switchgrass with bicolor lespedeza, add 5 to 7 pounds of grass seed to the rates listed above. Seed should be sown 1/2 to 1 inch deep depending on soil conditions. Use an adequate mulch such as straw or wood fiber mulch to hold seed in place on highly erodible sites and help retain moisture on droughty sites.

Use normal tree planting procedures to establish seedlings at 2 to 3 feet in row spacing with 3 to 4 feet row spacing. This method is usually more expensive than seeding, but a good stand can be attained more quickly.

Management

Before or at the time of seeding, 300 to 500 pounds of 0-12-12 or 0-20-20 fertilizer can be applied to the planting area. Use 100-200 lbs./ac. of 0-20-20 annually in the spring to maintain a good stand. The site's pH should be corrected to 6.5, if it is below 5.5. Seedlings do not compete well with overtopping weed growth. Control is best attained by allowing weeds grow to a height from 18 to 24 inches tall. Then, mow the weeds to a height equal to that of the lespedeza seedlings.

Cultivars, Improved, and Selected Materials (and area of origin)

'Natob' (China) is the only cultivar of bicolor lespedeza to have been developed and released to the commercial market. It was released cooperatively with the USDA-ARS and the Maryland Agricultural Experiment Station in 1952.

Bicolor lespedezas is distributed throughout the East. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Control

Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA, NRCS does not guarantee or

warranty the products and control methods named, and other products may be equally effective.

Prepared By & Species Coordinator:
USDA NRCS Plant Materials Program

05Feb2002 JLK

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS (<http://plants.usda.gov>) and Plant Materials Program Web sites (<http://PlantMaterials.nrcs.usda.gov>).

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

APPENDIX G

Habitat Assessment forms

APPENDIX E

HABITAT ASSESSMENT DATA SHEET- HIGH GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	RIVER MILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET#		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____	REASON FOR SURVEY
		TIME _____ AM PM	

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new-fall and not transient)	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new-fall, but not yet prepared for colonization (may rate at high end of scale)	20-40% mix of stable habitat; availability less than desirable; substrate frequently disturbed or removed	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow) (Slow is <0.3m/s deep is >0.5m)	Only 3 of the 4 regimes present (if fast-shallow is missing score lower than regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low)	Dominated by 1 velocity/depth regime (usually slow-deep)
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

APPENDIX E (Continued)

HABITAT ASSESSMENT DATA SHEET- HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																			
	Optimal					Suboptimal					Marginal					Poor				
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures, present on both banks; and 40 to 30% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.				
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5-7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.					Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.					Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.					Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >35.				
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods					Unstable; many eroded area; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars				
Note: determine left or right side by facing downstream.																				
SCORE (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0		
SCORE (RB)	Right Bank	10	9			8	7	6			5	4	3			2	1	0		
9. Vegetative Protective (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height				
SCORE (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0		
SCORE (RB)	Right Bank	10	9			8	7	6			5	4	3			2	1	0		
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone > 18 meters; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns or crops) have not impacted zone					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.				
SCORE (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0		
SCORE (RB)	Right Bank	10	9			8	7	6			5	4	3			2	1	0		

TOTAL SCORE _____

Adapted from Appendix A-1 Habitat Assessment and Physiochemical Characterization Field Data Sheets - Form, EPA 841-B-99-002

APPENDIX F

HABITAT ASSESSMENT DATA SHEET- LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	RIVER MILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET#	AGENCY		
INVESTIGATORS			
FORM COMPLETED BY		DATE	REASON FOR SURVEY
		TIME	AM PM

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

APPENDIX F (Continued)

HABITAT ASSESSMENT DATA SHEET- LOW GRADIENT STREAMS (BACK)

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

TOTAL SCORE _____

APPENDIX H

Conservation Easement (Model)

MODEL CONSERVATION EASEMENT

January 18, 2001
Rev'd October 16, 2002
Rev'd August, 2003

Model Conservation Easement for use in preserving mitigation property. Language in italics is instructional, and should be deleted when site-specific Conservation Easement is prepared.

PERMANENT CONSERVATION EASEMENT

THIS CONSERVATION EASEMENT ("Conservation Easement") made this _____ day of _____, 200__ by and between _____ ("Grantor") and _____ (Grantee).

The designation Grantor and Grantee as used herein shall include said parties, their heirs, successors and assigns, and shall include singular, plural, masculine, feminine or neuter as required by context.

RECITALS

WHEREAS, Grantor owns in fee simple certain real property situated, lying and being in _____ County, North Carolina, more particularly described in Exhibit A attached hereto and incorporated herein ("Property");

WHEREAS, Grantee is [either a public body of this state, an agency of the United States, or a nonprofit corporation or trust whose purpose is the conservation of property], and is qualified to be the Grantee of a conservation easement pursuant to N.C. Gen. Stat. § 121-35;

WHEREAS, Grantor and Grantee recognize the conservation, scenic, natural, or aesthetic value of the property in its natural state, which includes the following natural communities: [describe by wetland and/or stream type, as well as any associated buffers or upland communities]. The purpose of this Conservation Easement is to maintain wetland and/or riparian resources and other natural values of the Property, and prevent the use or development of the Property for any purpose or in any manner that would conflict with the maintenance of the Property in its natural condition.

[For use when the mitigation is offered for impacts of a single individual or general permit use] WHEREAS, the preservation of the Property is a condition of Department of the Army permit Action ID _____ issued by the Wilmington District Corps of Engineers, required to mitigate for unavoidable stream and/or wetland impacts authorized by that permit. Grantor and Grantee agree that third-party rights of enforcement shall be held by the U.S. Army Corps of Engineers, Wilmington District

(Corps, to include any successor agencies), and that these rights are in addition to, and do not limit, the rights of enforcement under said permit.

[Alternate paragraph for use when the conservation easement supports a mitigation bank] WHEREAS, the preservation of the Property is required by a Mitigation Banking Instrument for the [Name of Bank], Department of the Army Action ID [Action ID number for the mitigation bank]. The Mitigation Bank is intended to be used to compensate for unavoidable stream and/or wetland impacts authorized by permits issued by the Department of the Army. Grantor and Grantee agree that third-party rights of enforcement shall be held by the U.S. Army Corps of Engineers, Wilmington District (Corps, to include any successor agencies), and that these rights are in addition to, and do not limit, the rights of the parties to the Mitigation Banking Instrument.

NOW, THEREFORE, for and in consideration of the covenants and representations contained herein and for other good and valuable consideration, the receipt and legal sufficiency of which is hereby acknowledged, Grantor hereby unconditionally and irrevocably grants and conveys unto Grantee, its heirs, successors and assigns, forever and in perpetuity a Conservation Easement of the nature and character and to the extent hereinafter set forth, over the Property described on Exhibit A, together with the right to preserve and protect the conservation values thereof, as follows:

ARTICLE I. DURATION OF EASEMENT

This Conservation Easement shall be perpetual. This conservation Easement is an easement in gross, runs with the land and is enforceable by Grantee against Grantor, Grantor's personal representatives, heirs, successors and assigns, lessees, agents and licensees.

ARTICLE II. PROHIBITED AND RESTRICTED ACTIVITIES

Any activity on, or use of, the Property inconsistent with the purpose of this Conservation Easement is prohibited. The Property shall be preserved in its natural condition and restricted from any development that would impair or interfere with the conservation values of the Property.

Without limiting the generality of the foregoing, the following activities and uses are expressly prohibited, restricted or reserved as indicated hereunder:

A. Disturbance of Natural Features. Any change disturbance, alteration or impairment of the natural features of the Property or any introduction of non-native plants and/or animal species is prohibited.

B. Construction. There shall be no constructing or placing of any building, mobile home, asphalt or concrete pavement, billboard or other advertising display,

antenna, utility pole, tower, conduit, line, pier, landing, dock or any other temporary or permanent structure or facility on or above the Property.

C. Industrial, Commercial and Residential Use. Industrial, residential and/or commercial activities, including any right of passage for such purposes are prohibited.

D. Agricultural, Grazing and Horticultural Use. Agricultural, grazing, animal husbandry, and horticultural use of the Property are prohibited.

E. Vegetation. There shall be no removal, burning, destruction, harming, cutting or mowing of trees, shrubs, or other vegetation on the Property.

F. Roads and Trails. There shall be no construction of roads, trails or walkways on the property; nor enlargement or modification to existing roads, trails or walkways.

G. Signage. No signs shall be permitted on or over the Property, except the posting of no trespassing signs, signs identifying the conservation values of the Property, signs giving directions or proscribing rules and regulations for the use of the Property and/or signs identifying the Grantor as owner of the property.

H. Dumping or Storage. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery or hazardous substances, or toxic or hazardous waste, or any placement of underground or aboveground storage tanks or other materials on the Property is prohibited.

I. Excavation, Dredging or Mineral Use. There shall be no grading, filling, excavation, dredging, mining or drilling; no removal of topsoil, sand, gravel, rock, peat, minerals or other materials, and no change in the topography of the land in any manner on the Property, except to restore natural topography or drainage patterns.

J. Water Quality and Drainage Pattern. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or related activities, or altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns. In addition, diverting or causing or permitting the diversion of surface or underground water into, within or out of the easement area by any means, removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides is prohibited.

K. Development Rights. No development rights that have been encumbered or extinguished by this Conservation Easement shall be transferred pursuant to a transferable development rights scheme or cluster development arrangement or otherwise.

L. Vehicles. The operation of mechanized vehicles, including, but not limited to, motorcycles, dirt bikes, all-terrain vehicles, cars and trucks is prohibited. *[The Corps will generally allow the use of vehicles on existing roads provided those roads are*

identified by reference to a recorded map showing their location, configuration, and size.]

M. Other Prohibitions. Any other use of, or activity on, the Property which is or may become inconsistent with the purposes of this grant, the preservation of the Property substantially in its natural condition, or the protection of its environmental systems, is prohibited.

ARTICLE III GRANTOR'S RESEVERED RIGHTS

The Grantor expressly reserves for himself, his personal representatives, heirs, successors or assigns, the right to continue the use of the property for all purposes not inconsistent with this Conservation Easement, including, but not limited to, the right to quiet enjoyment of the Property, the rights of ingress and egress, the right to hunt, fish, and hike on the Property, the right to sell, transfer, gift or otherwise convey the Property, in whole or in part, provided such sale, transfer or gift conveyance is subject to the terms of, and shall specifically reference, this Conservation Easement.

[For use when mitigation work (approved or required restoration, creation, or enhancement) is to be done on the property] Notwithstanding the foregoing Restrictions, Grantor reserves for Grantor, its successors and assigns, the right to construct wetland and stream mitigation on the Property, in accordance with the *[describe mitigation plan by title, date and permit action id if a single mitigation site; if a mitigation bank, include the language "detailed mitigation plan approved in accordance with the Mitigation Banking Instrument for the _____ Mitigation Bank.]*

ARTICLE IV. GRANTEE'S RIGHTS

The Grantee or its authorized representatives, successors and assigns, and the Corps, shall have the right to enter the Property at all reasonable times for the purpose of inspecting said property to determine if the Grantor, or his personal representatives, heirs, successors, or assigns, is complying with the terms, conditions, restrictions, and purposes of this Conservation Easement. The Grantee shall also have the right to enter and go upon the Property for purposes of making scientific or educational observations and studies, and taking samples. The easement rights granted herein do not include public access rights.

ARTICLE V ENFORCEMENT AND REMEDIES

A. To accomplish the purposes of this Easement, Grantee is allowed to prevent any activity on or use of the Property that is inconsistent with the purposes of this Easement and to require the restoration of such areas or features of the Property that may be damaged by such activity or use. Upon any breach of the terms of this Conservation

Easement by Grantor that comes to the attention of the Grantee, the Grantee shall notify the Grantor in writing of such breach. The Grantor shall have 30 days after receipt of such notice to correct the conditions constituting such breach. If the breach remains uncured after 30 days, the Grantee may enforce this Conservation Easement by appropriate legal proceedings including damages, injunctive and other relief. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief if the breach of the term of this Conservation Easement is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement. The Grantor and Grantee acknowledge that under such circumstances damage to the Grantee would be irreparable and remedies at law will be inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement. The costs of a breach, correction or restoration, including the Grantee's expenses, court costs, and attorneys' fees, shall be paid by Grantor, provided Grantor is determined to be responsible for the breach. The Corps shall have the same right to enforce the terms and conditions of this easement as the Grantee.

B. No failure on the part of the Grantee to enforce any covenant or provision hereof shall discharge or invalidate such covenant or any other covenant, condition, or provision hereof or affect the right to Grantee to enforce the same in the event of a subsequent breach or default.

C. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury or change in the Property resulting from causes beyond the Grantor's control, including, without limitation, fire, flood, storm, war, acts of God or third parties, except Grantor's lessees or invitees; or from any prudent action taken in good faith by Grantor under emergency conditions to prevent, abate, or mitigate significant injury to life, damage to property or harm to the Property resulting from such causes.

ARTICLE VI MISCELLANEOUS

A. Warranty. Grantor warrants, covenants and represents that it owns the Property in fee simple, and that Grantor either owns all interests in the Property which may be impaired by the granting of this Conservation Easement or that there are no outstanding mortgages, tax liens, encumbrances, or other interests in the Property which have not been expressly subordinated to this Conservation Easement. Grantor further warrants that Grantee shall have the use of and enjoy all the benefits derived from and arising out of this Conservation Easement, and that Grantor will warrant and defend title to the Property against the claims of all persons.

B. Subsequent Transfers. The Grantor agrees to incorporate the terms of this Conservation Easement in any deed or other legal instrument that transfers any interest in all or a portion of the Property. The Grantor agrees to provide written notice of such transfer at least thirty (30) days prior to the date of the transfer. The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof and shall not be amended, modified or terminated without the prior written consent and approval of the Corps.

C. Assignment. The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

D. Entire Agreement and Severability. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be void or unenforceable by a court of competent jurisdiction, the remainder shall continue in full force and effect.

E. Obligations of Ownership. Grantor is responsible for any real estate taxes, assessments, fees, or charges levied upon the Property. Grantor shall keep the Property free of any liens or other encumbrances for obligations incurred by Grantor. Grantee shall not be responsible for any costs or liability of any kind related to the ownership, operation, insurance, upkeep, or maintenance of the Property, except as expressly provided herein. Nothing herein shall relieve the Grantor of the obligation to comply with federal, state or local laws, regulations and permits that may apply to the exercise of the Reserved Rights.

F. Extinguishment. In the event that changed conditions render impossible the continued use of the Property for the conservation purposes, this Conservation Easement may only be extinguished, in whole or in part, by judicial proceeding.

G. Eminent Domain. Whenever all or part of the Property is taken in the exercise of eminent domain so as to substantially abrogate the Restrictions imposed by this Conservation Easement, Grantor and Grantee shall join in appropriate actions at the time of such taking to recover the full value of the taking, and all incidental and direct damages due to the taking.

H. Proceeds. This Conservation Easement constitutes a real property interest immediately vested in Grantee. In the event that all or a portion of this Property is sold, exchanged, or involuntarily converted following an extinguishment or the exercise of eminent domain, Grantee shall be entitled to the fair market value of this Conservation

Easement. The parties stipulate that the fair market value of this Conservation Easement shall be determined by multiplying the fair market value of the Property unencumbered by this Conservation Easement (minus any increase in value after the date of this grant attributable to improvements) by the ratio of the value of this easement at the time of this grant to the value of the Property (without deduction for the value of this Conservation Easement) at the time of this grant. The values at the time of this grant shall be the values used, or which would have been used, to calculate a deduction for federal income tax purposes, pursuant to Section 170(h) of the Internal Revenue Code (whether eligible or ineligible for such a deduction). Grantee shall use its share of the proceeds in a manner consistent with the purposes of this Conservation Easement.

I. Notification. Any notice, request for approval, or other communication required under this Conservation Easement shall be sent by registered or certified mail, postage prepaid, to the following addresses (or such address as may be hereafter specified by notice pursuant to this paragraph):

To Grantor:

[Name, address and fax number]

To Grantee:

[Name, address and fax number]

To the Corps:

[Name, address and fax number]

J. Failure of Grantee. If at any time Grantee is unable or fails to enforce this Conservation Easement, or if Grantee ceases to be a qualified grantee, and if within a reasonable period of time after the occurrence of one of these events Grantee fails to make an assignment pursuant to this Conservation Easement, then the Grantee's interest shall become vested in another qualified grantee in accordance with an appropriate proceeding in a court of competent jurisdiction.

K. Amendment. This Conservation Easement may be amended, but only in a writing signed by all parties hereto, and provided such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the conservation purposes of this grant.

L. *[For use if there is a document describing the current condition of the property. The language provided is applicable if there is a mitigation plan that accurately describes the current condition and uses of the property. If there is not such a plan, another document we agree is accurate and can be identified and is in our files can be referenced.]* Present Condition of the Property. The wetlands, scenic, resource, environmental, and other natural characteristics of the Property, and its current use and state of improvement, are described in Section ____, Appendix B of the Mitigation Plan,

dated _____, prepared by Grantor and acknowledged by the Grantor and Grantee to be complete and accurate as of the date hereof. Both Grantor and Grantee have copies of this report. It will be used by the parties to assure that any future changes in the use of the Property will be consistent with the terms of this Conservation Easement. However, this report is not intended to preclude the use of other evidence to establish the present condition of the Property if there is a controversy over its use.

TO HAVE AND TO HOLD the said rights and easements perpetually unto Grantee for the aforesaid purposes.

IN TESTIMONY WHEREOF, the Grantor has hereunto set his hand and seal, the day and year first above written.

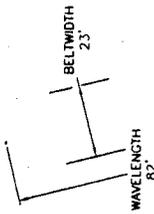
[Signatures of the Grantor and Grantee in appropriate form]

APPENDIX I
Mitigation Plans

OWL CREEK

REFERENCE REACH (EXISTING CONDITIONS)

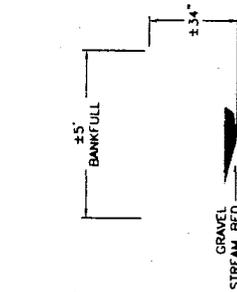
Stream Section #10
Scale: 1" = 40'



See Cross Section Detail, this Sheet



0+00



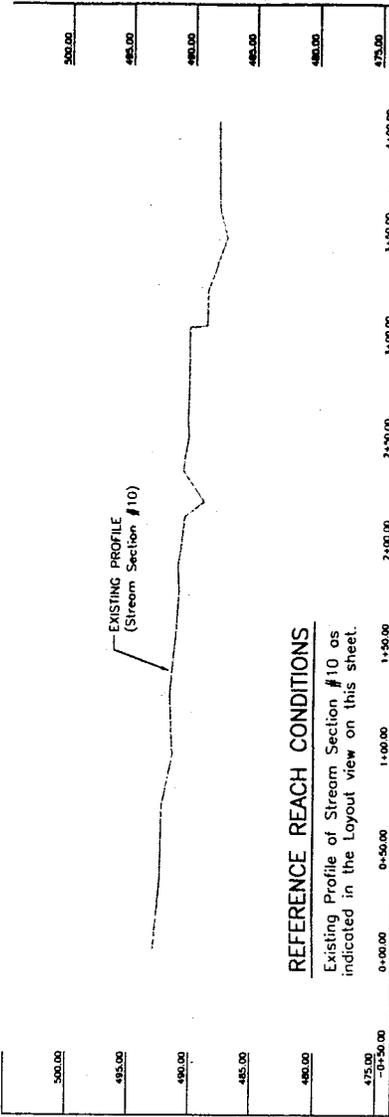
±1 1/2:1 SLOPE

REFERENCE STREAM CROSS SECTION (A-A)

EXISTING CONDITIONS: STREAM SECTION #10

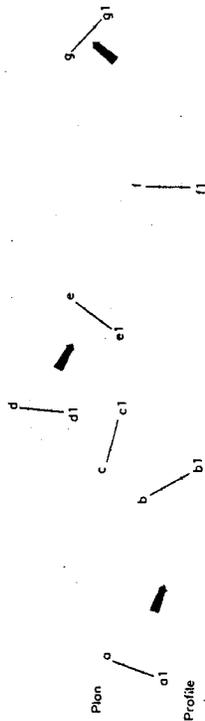
SCALE: 1" = 1'

For Plans: SEE PLAN 03; For Profiles: SEE PROFILE 03; For Elevation: SEE ELEVATION 03; For Stationing: SEE STATIONING 03



REFERENCE REACH CONDITIONS

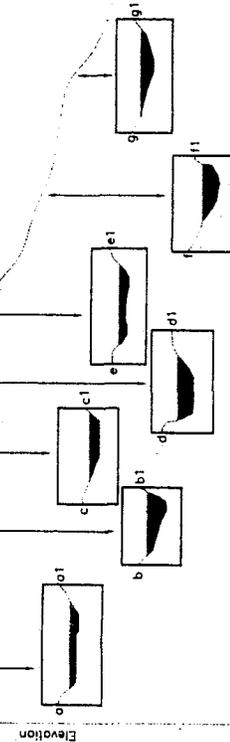
Existing Profile of Stream Section #10 as indicated in the Layout view on this sheet.



TYPICAL DESIGN PLAN AND PROFILE

Channel Cross Sections shall vary based on width, depth, and slope.

NOTE: This conceptual detail is intended to illustrate the desire for the restored stream flowing to meander between stream banks as the flow transitions from riffle to pool sections throughout the design length.

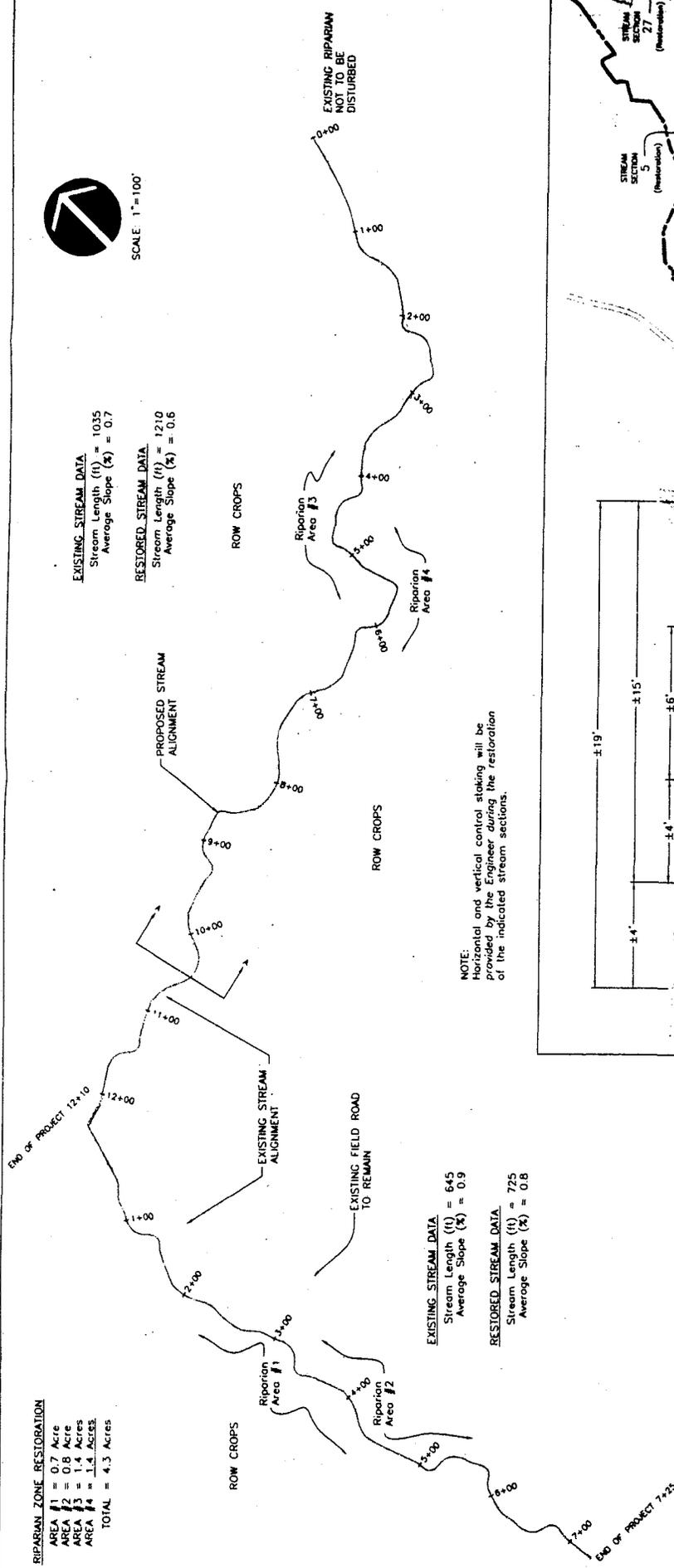




SCALE: 1"=100'

EXISTING STREAM DATA
Stream Length (ft) = 1035
Average Slope (%) = 0.7

RESTORED STREAM DATA
Stream Length (ft) = 1210
Average Slope (%) = 0.6

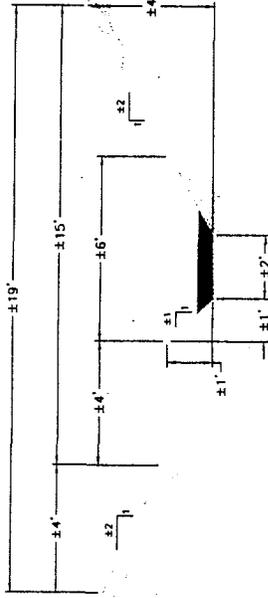
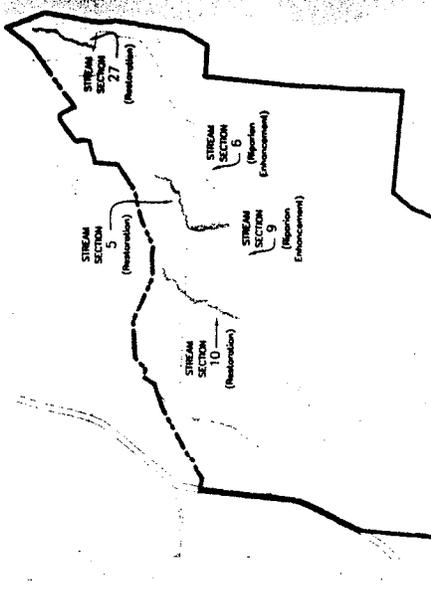


RIPARIAN ZONE RESTORATION
AREA #1 = 0.7 Acre
AREA #2 = 0.8 Acre
AREA #3 = 1.4 Acres
AREA #4 = 1.4 Acres
TOTAL = 4.3 Acres

EXISTING STREAM DATA
Stream Length (ft) = 645
Average Slope (%) = 0.9

RESTORED STREAM DATA
Stream Length (ft) = 725
Average Slope (%) = 0.8

NOTE:
Horizontal and vertical control staking will be provided by the Engineer during the restoration of the indicated stream sections.



EXISTING STREAM CROSS SECTION (A-A)
EXISTING CONDITIONS; STREAM SECTION #5
SCALE: 1/4" = 1'

1530 Polk St. Corinth, MS 38834 (662) 287-2436

SCOTT ENGINEERING

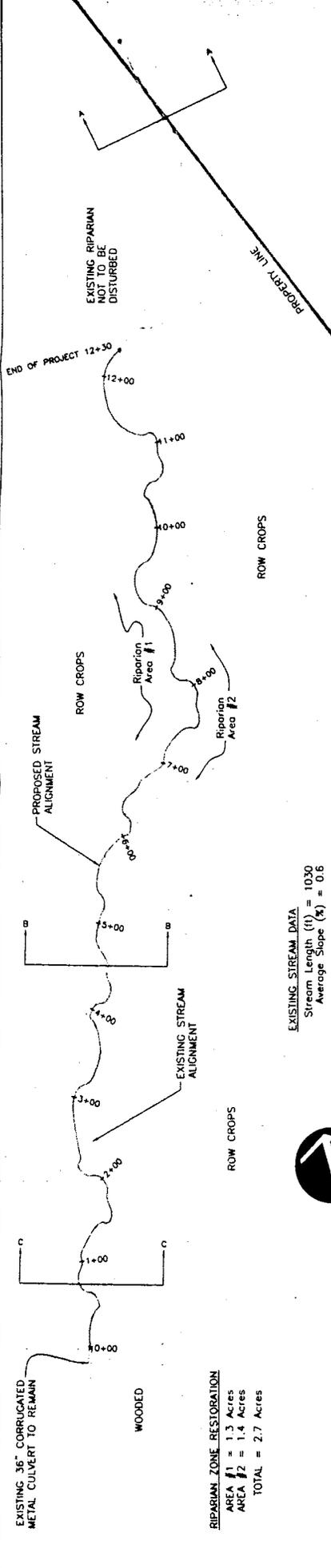
HAWKINS DAM - McNAIRY CO., TN

COMPENSATORY MITIGATION

STREAM SECTION #5

M4

S/E

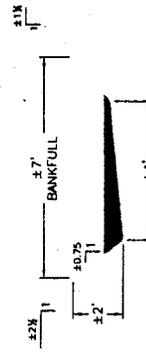


EXISTING STREAM DATA
 Stream Length (ft) = 1030
 Average Slope (%) = 0.6

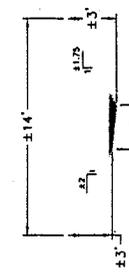
RESTORED STREAM DATA
 Stream Length (ft) = 1230
 Average Slope (%) = 0.5

SCALE: 1" = 100'

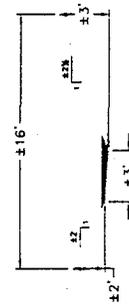
RIPIARIAN ZONE RESTORATION
 AREA #1 = 1.3 Acres
 AREA #2 = 1.4 Acres
 TOTAL = 2.7 Acres



EXISTING STREAM CROSS SECTION (A-A)
 EXISTING CONDITIONS: STREAM SECTION #27
 SCALE: 1/4" = 1'

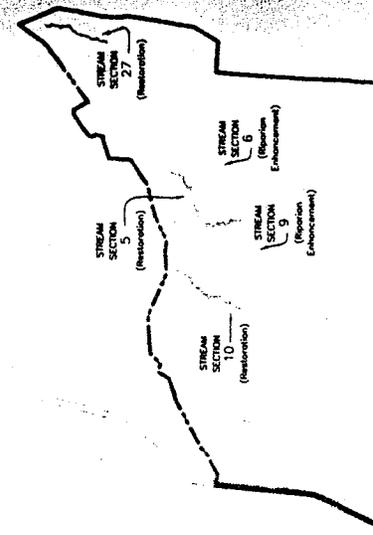


EXISTING STREAM CROSS SECTION (B-B)
 EXISTING CONDITIONS: STREAM SECTION #27
 SCALE: 1/8" = 1'



EXISTING STREAM CROSS SECTION (C-C)
 EXISTING CONDITIONS: STREAM SECTION #27
 SCALE: 1/8" = 1'

NOTE:
 Horizontal and vertical control staking will be provided by the Engineer during the restoration of the indicated stream sections.



EXISTING STREAM CROSS SECTION (A-A)
 EXISTING CONDITIONS: STREAM SECTION #27
 SCALE: 1/4" = 1'

EXISTING STREAM CROSS SECTION (B-B)
 EXISTING CONDITIONS: STREAM SECTION #27
 SCALE: 1/8" = 1'

EXISTING STREAM CROSS SECTION (C-C)
 EXISTING CONDITIONS: STREAM SECTION #27
 SCALE: 1/8" = 1'

APPENDIX J

Soil Survey Information (NRCS – Soil Survey – McNairy Co.)

Engineering Properties

McNairy County, Tennessee

[Absence of an entry indicates that the data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index	
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200			
				Pct		Pct		Pct					
En: ENVILLE	0-7	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0	100	95-100	65-85	30-60	15-20	NP-7	
	7-60	Loam, Silt loam, Sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0	100	95-100	60-100	30-85	15-30	NP-7	
Ha: HATCHIE	0-7	Silt loam	CL, CL-ML, ML	A-4	0	0	100	100	95-100	70-95	15-25	3-10	
	7-19	Silty clay loam, Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	70-95	20-32	6-14	
	19-26	Clay loam, Loam, Silt loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	60-85	22-34	6-15	
	26-60	Clay loam, Loam, Silt loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	51-80	20-38	6-18	
Iu: IUKA	0-14	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0	95-100	90-100	70-100	30-60	15-20	NP-7	
	14-25	Fine sandy loam, Loam, Sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	95-100	85-100	65-100	36-75	15-30	NP-7	
	25-60	Fine sandy loam, Loam, Sandy loam	ML, SM	A-2, A-4	0*	0	95-100	90-100	70-100	25-60	15-30	NP-7	

Engineering Properties

McNairy County, Tennessee

Map symbol and soil name	Depth In	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
			Pct		Pct		Pct				Pct	
OKC3: OKTIBBEHA	0-5	Clay	CH, CL, ML	A-7	0	0	100	95-100	90-100	75-95	42-64	19-34
	5-38	Clay	CH	A-7	0	0	100	95-100	95-100	95-100	55-65	30-40
	38-60	Clay, Silty clay	CL	A-7	0	0-5	95-100	90-100	90-100	90-100	41-49	25-30
Osd: OKTIBBEHA	0-4	Clay loam	CL	A-6, A-7	0	0	100	95-100	90-100	70-100	32-50	12-28
	4-40	Clay	CH	A-7	0	0	100	95-100	95-100	95-100	55-65	30-40
	40-60	Clay, Silty clay	CL	A-7	0	0-5	95-100	90-100	90-100	90-100	41-49	25-30
SUMTER	0-10	Silty clay	CL	A-6, A-7	0	0	90-100	85-100	80-98	75-90	35-50	16-25
	10-23	Clay, Silty clay, Silty clay loam	CH, CL	A-6, A-7	0	0	85-100	78-98	75-95	75-95	35-55	16-32
	23-32	Channery silty clay loam, Silty clay, Silty clay loam	CH, CL	A-6, A-7	0	0	80-100	65-98	60-95	55-95	35-55	16-32
	32-60	Weathered bedrock	---	---	0	---	---	---	---	---	---	---

Engineering Properties

McNairy County, Tennessee

Map symbol and soil name	Depth <i>In</i>	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
SaE: SAFFELL	0-6	Gravelly sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2, A-4	0	0-5	50-80	50-75	40-70	20-50	15-25	NP-5
	6-16	Gravelly fine sandy loam, Gravelly loam, Gravelly sandy clay loam	GC; GC-GM, SC, SC-SM	A-1, A-2, A-4, A-6	0	0-10	30-75	25-75	20-70	12-50	20-40	4-18
	16-46	Very gravelly fine sandy loam, Very gravelly loam, Very gravelly sandy clay loam	GC, GC-GM, GP-GC	A-1, A-2, A-4, A-6	0	0-10	25-55	25-50	20-50	12-40	20-40	4-15
	46-60	Gravelly loamy sand, Gravelly sandy loam, Very gravelly sandy loam	GC, GM, SC, SM	A-1, A-2, A-3	0	0-15	15-80	10-75	10-65	5-35	15-35	NP-15
Uni: UNA	0-4	Silty clay loam	CH, CL	A-7	0	0	100	100	90-100	75-95	41-65	20-40
	4-60	Clay, Silty clay, Silty clay loam	CH, CL	A-7	0	0	100	100	90-100	75-95	41-65	20-40

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is less percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table R.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Chemical Soil Properties

McNairy County, Tennessee

[Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100 g</i>	<i>meq/100 g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
En:								
ENVILLE	0-7	--	--	5.1-6.5	--	--	--	--
	7-60	--	--	4.5-5.5	--	--	--	--
Ha:								
HATCHIE	0-7	--	--	5.6-6.5	--	--	--	--
	7-19	--	--	4.5-5.5	--	--	--	--
	19-26	--	--	4.5-5.5	--	--	--	--
	26-60	--	--	5.1-6.5	--	--	--	--
Iu:								
IUKA	0-14	--	--	5.1-6.0	--	--	--	--
	14-25	--	--	4.5-5.5	--	--	--	--
	25-60	--	--	4.5-5.5	--	--	--	--
OkC3:								
OKTIBBEHA	0-5	--	--	4.5-6.5	--	--	--	--
	5-38	--	--	4.5-6.5	--	--	--	--
	38-60	--	--	6.6-8.4	--	--	--	--
OsD:								
OKTIBBEHA	0-4	--	--	4.5-6.5	--	--	--	--
	4-40	--	--	4.5-6.5	--	--	--	--
	40-60	--	--	6.6-8.4	--	--	--	--
SUMTER	0-10	--	--	6.6-8.4	--	--	--	--
	10-23	--	--	7.4-8.4	--	--	--	--
	23-32	--	--	7.4-8.4	--	--	--	--
	32-60	--	--	--	--	--	--	--
SaE:								
SAFFELL	0-6	--	5.0-15	4.5-5.5	--	--	--	--
	6-16	--	5.0-20	4.5-5.5	--	--	--	--
	16-46	--	10-20	4.5-5.5	--	--	--	--
	46-60	--	5.0-15	4.5-5.5	--	--	--	--
Un:								
UNA	0-4	--	--	4.5-5.5	--	--	--	--
	4-60	--	--	4.5-5.5	--	--	--	--

This report shows only the major soils in each map unit. Others may exist.

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Ponds and Embankments

McNairy County, Tennessee

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
En:							
ENVILLE	100	Somewhat limited Seepage	0.72	Very limited Depth to saturated zone Piping Seepage	1 1 0.03	Somewhat limited Slow refill Cutbanks cave	0.28 0.1
Ha:							
HATCHIE	100	Somewhat limited Depth to cemented pan Seepage	0.95 0.72	Very limited Depth to saturated zone Piping Thin layer	1 1 0.95	Very limited No ground water	1
Iu:							
IUKA	100	Somewhat limited Seepage	0.72	Very limited Depth to saturated zone	1	Somewhat limited Slow refill Cutbanks cave Depth to water	0.28 0.1 0.01
OKC3:							
OKTIBBEHA	100	Not limited		Somewhat limited Hard to pack	0.64	Very limited No ground water	1
OsD:							
OKTIBBEHA	55	Somewhat limited Slope	0.02	Somewhat limited Hard to pack	0.64	Very limited No ground water	1
SUMTER							
	35	Somewhat limited Seepage Depth to bedrock Slope	0.47 0.08 0.02	Somewhat limited Thin layer	0.81	Very limited No ground water	1
SaE:							
SAFFELL	100	Very limited Seepage Slope	1 0.15	Somewhat limited Seepage	0.25	Very limited No ground water	1
Un:							
UNA	100	Not limited		Very limited Depth to saturated zone Hard to pack	1 0.5	Very limited Slow refill Cutbanks cave	1 0.1

Ponds and Embankments

This table gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. Not limited indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the saturated hydraulic conductivity (Ksat) of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, Ksat of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

APPENDIX K
ARAP Application



DEPARTMENT OF ENVIRONMENT & CONSERVATION
DIVISION OF WATER POLLUTION CONTROL

**APPLICATION
FOR
AQUATIC RESOURCE ALTERATION PERMIT**

All necessary information must be submitted before applications can be processed.
Plans of the proposed work must be approved before a permit can be issued.

Allow up to 90 days for processing an individual permit.
Allow up to 30 days for processing a general permit.

APPLICANT

Name: Bill Hawkins

Address: 3405 Pearson Road
Memphis, TN 38118

Phone Number: (901) 743 - 5120 Fax Number: (901) 743 - 4839

LOCATION

County: McNairy

Nearest City or Town: Michie

Name of river, stream, or waterbody where activity is proposed: unnamed tributary of Little Owl Creek

SCHEDULE:

Date activity is proposed to commence: (September '05)
Date pending, subject to receipt of req'd permits

Date activity is expected to be completed: Approximately 3 to 4 months after commencement

Is any portion of the activity now complete? No

If yes, detail the extent of the completed portion of the activity. Use an attachment if necessary.

DETAILED DESCRIPTION OF THE PROPOSED PROJECT

Include with this application a detailed description of the proposed project. This description should include the following items:

1. a cover letter describing the basic purpose of the proposed project,
2. the exact location of the project indicated on a topographic map (or photographic copy with quad name)
3. a single copy of detailed plans, blueprints, or legible sketches, which include the following:
 - a. a description of existing stream characteristics and dimensions such as depth, length, average width, substrate, and stream-side vegetation
 - b. a description of any proposed channel modifications, such as depth, length, average width, substrate, and stream-side vegetation
 - c. amount, in cubic yards, and location of excavation and dredging
 - d. total area and location of clearing and grading
 - e. methods of excavation, grading or fill, and the materials to be excavated or placed
 - f. location and type of erosion and sedimentation control structures
 - g. other alterations to the properties of waters of the state

APPLICANT'S SIGNATURE

Application is hereby made for a permit for the activity or activities described herein. I am familiar with the information contained in this application, and it is true, complete, and accurate to the best of my knowledge. I understand I am responsible for obtaining any other applicable federal, state, and local authorizations or permits.

Shane Cardwell
Signature of Applicant

7/13/05
Date

Shane Cardwell, Owner's agent
(TYPE or PRINT) Name and Title of Applicant

An application submitted by a corporation must be signed by a principal executive officer, from a partnership or proprietorship, by the partner or proprietor respectively, from a municipal, state, federal, or other public agency or facility, the application must be signed by either a principal executive officer, ranking elected official, or other duly authorized employee.

Submit application to:

DEPARTMENT OF ENVIRONMENT & CONSERVATION
DIVISION OF WATER POLLUTION CONTROL
NATURAL RESOURCES SECTION
6TH FLOOR L & C ANNEX
401 CHURCH STREET
NASHVILLE TN 37243-1534

PHONE (615) 532-0625
FAX (615) 532-0046

APPENDIX L

Joint Application (Department of the Army/TVA)

JOINT APPLICATION FORM

Department of the Army/TVA

Paperwork Reduction Act Statement - Public reporting burden for this collection of information is estimated to average 1.5 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 Agency Clearance Officer, Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402; and to the Office of Management and Budget, Paperwork Reduction Project (3316-0060), Washington, D.C. 20503.

The Department of the Army (DA) permit program is authorized by Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (P.L. 95-217). These laws require permits authorizing structures and work in or affecting navigable waters of the United States and the discharge of dredged or fill material into waters of the United States. Section 26a of the Tennessee Valley Authority Act, as amended, prohibits the construction, operation, or maintenance of any structure affecting navigation, flood control, or public lands or reservations across, along, or in the Tennessee River or any of its tributaries until plans for such construction, operation, and maintenance have been submitted to and approved by the Tennessee Valley Authority (TVA).

Name and Address of Applicant

Bill Hawkins
3405 Pearson Rd
Memphis, TN 38118

Telephone Number

Home (901) 848-6584

Office (901) 743 5120

Name, Address, and Title of Authorized Agent

Shane Cardwell, E.I.
1530 Polk Street
Corinth, MS 38834

Telephone Number

Home (662) 223-0525

Office (662) 287-2436

Location where activity exists or will occur (include Stream Name and Mile, if known)

The proposed impoundment will be located along an unnamed tributary of Little Owl Creek, lying South of Little Owl Creek and East of TN State Route 224 between Michie and Stantonville, McNairy Co., TN

Application submitted to

DA Yes No TVA Yes No

Date activity is proposed to commence

Date pending, subject to receipt of req'd permits (Sept '05)

Date activity is proposed to be completed

Approximately 3 to 4 months after commencement of construction.

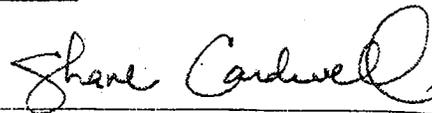
Describe in detail the proposed activity, its purpose and intended use (private, public, commercial, or other). Describe structures to be erected including those placed on fills, piles, or floating platforms. Also describe the type, composition, and quantity of materials to be discharged or placed in the water; the means of conveyance; and the source of discharge or fill material. Please attach additional sheets if needed.

SEE ATTACHMENTS

Application is hereby made for approval of the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. I agree that, if this application is approved by TVA, I will comply with the attached terms and conditions and any special conditions that may be imposed by TVA at the time of approval. Please note the U.S. Army Corps of Engineers may impose additional conditions or restrictions.

7/13/05

Date



Signature of Applicant or Authorized Agent

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 by any trick, scheme, or device 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 statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both. The appropriate DA fee will be assessed when a permit is issued.

Names, addresses, and telephone numbers of adjoining property owners, lessees, etc., whose properties also join the waterway.

SEE ATTACHMENT

List of previous DA/TVA permits/approvals

DA

Permit Number

TVA

Date

Is any portion of the activity for which authorization is sought now complete?

Yes

No

If answer is "Yes" attach explanation. Month and year the activity was completed

Indicate the existing work on the drawings.

List all approvals or certifications required by other federal, interstate, state, or local agencies for any structures, construction, discharges, deposits, or other activities described in this application.

<u>Issuing Agency</u>	<u>Type Approval</u>	<u>Identification No.</u>	<u>Date of Application</u>	<u>Date of Approval</u>
TDEC	AQUATIC RESOURCE ALTERATION PERMIT		July 13, 2005	Pending
TDEC	Construction Storm Water Permit			

Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein?
 Yes No (If "Yes" attach explanation)

Privacy Act Statement

This information is being requested in accordance with Section 26a of the TVA Act as cited on the front page of this form. Disclosure of the information requested is voluntary; however, failure to provide any required information or documents may result in a delay in processing your application or in your being denied a Section 26a permit. An application that is not complete will be returned for additional information. TVA uses this information to assess the impact of the proposed project on TVA programs and the environment and to determine if the project can be approved. The data requested are necessary in order to communicate with the applicant and to evaluate the application. Information in the application is made a matter of public record through issuance of a public notice if warranted. Routine uses of this information include providing to federal, state, or local agencies, and to consultants, contractors, etc., for use in program evaluations, studies, or other matters involving support services to the program; to respond to a congressional inquiry concerning the application or Section 26a program; and for oversight or similar purposes, corrective litigation or law enforcement.

Two sets of original drawings on 8 1/2 " x 11" sheets that are suitable for reproduction and show the location and character of the proposed activity must be attached to this application and be submitted to the appropriate U.S. Army Corps of Engineers and TVA offices listed below.

Department of the Army Offices

TVA Office Locations

U.S. Army Engineer District, Nashville
 Corps of Engineers
 Attention: Regulatory Branch
 3701 Bell Road
 Nashville, Tennessee 37214
 Phone: (615) 369-7500

(Boone Dam Vicinity)
 Heritage Federal Bank Building, Suite 218
 4105 Fort Henry Drive
 Kingsport, Tennessee 37663-2250

(Ocoee 1,2,3)
 221 Old Ranger Road
 Murphy, NC 28906

U.S. Army Corps of Engineers
 Eastern Regulatory Field Office
 P.O. Box 465
 Lenoir City, TN 37771-0465
 Phone: (865) 986-7296

(Cherokee, Douglas, Nolichucky)
 2611 West Andrew Johnson Highway
 Morristown, TN 37814-3295

(Chickamauga, Nickajack)
 1101 Market Street, PSC 1E-C
 Chattanooga, TN 37402-2801

U.S. Army Corps of Engineers
 Western Regulatory Field Office
 2042 Beltline Road, SW
 Bldg. C, Suite 415
 Decatur, AL 35601
 Phone: (256) 350-5620

(Norris)
 Clinch-Powell Watershed Team
 P.O. Box 1589
 Norris, TN 37828

(Guntersville)
 2325 Henry Street
 Guntersville, AL 35976

(Melton Hill, Watts Bar)
 2009 Grubb Road
 Lenoir City, TN 37771

(Wheeler, Wilson, Tims Ford)
 119 County Road 412
 Town Creek, AL 35672

(Fort Loudon, Tellico)
 Suite 300
 804 Highway 321 North
 Lenoir City, TN 37771-6440

(Pickwick, Bear Creek)
 P.O. Box 1010
 Muscle Shoals, AL 35662

(Kentucky, Normandy)
 P.O. Box 280
 Paris, TN 38242-0280