TENNESSEE STREAM TSMP MITIGATION PROGRAM

May Prairie Stream Restoration Project
Mitigation Plan

Coffee County, Tennessee

TSMP Project No. 02-004-04

July 19, 2013

TENNESSEE STREAM TSMP MITIGATION PROGRAM

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1.0 OBJECTIVES

The TSMP intends to provide 3,328 credits by restoring 4,225 linear feet of an unnamed tributary to Hunt Creek located on the May Prairie State Natural Area in Manchester, Tennessee. These credits will be allocated to the Lower Tennessee Geographic Service Area, which encompasses the following five 8-digit HUC's:

- 06040005 Tennessee River (NW TN)
- 06040001 Tennessee River (SW TN)
- 06040004 Buffalo River
- 06040003 Lower Duck River
- 06040002 Upper Duck River

The objectives of the May Prairie Stream Restoration Project are as follows:

- Restore natural stream morphology
- Provide channel stability
- Restore / improve stream hydrology and floodplain connectivity
- Restore and enhance native riparian vegetation
- Improve aquatic habitat

2.0 SITE SELECTION

The project site was identified using the Compensation Planning Framework based on anticipated future needs in the service area. The factors in Sections 2.1 and 2.2 describe what was considered during the site selection process.

2.1 Service Area Needs

The Lower Tennessee Service area is a predominantly rural service area encompassing 7,107 square miles and 10,772 stream miles. Aquatic resource threats include altered hydrologic regimes, altered in-stream physical habitat conditions, altered near-stream (buffer) conditions, sedimentation, nutrient loading and thermal alteration most often caused by incompatible agricultural practices, urbanization, wastewater management practices, water management practices and invasive species.

Historic aquatic resource losses in this service area have resulted from activities such as channelization, channel relocation, channel widening and other alterations permitted through Aquatic Resource Alteration Permits (ARAP) from the Tennessee Department of Environment and Conservation (TDEC). Between 2000 and 2009, TDEC issued 1,272 ARAPs in this geographic service area accounting for nearly 15% of all ARAPs issued in the state of Tennessee.

2.2 Project Viability

The project has a high likelihood of success. The project stream is part of a headwater system that has a small drainage area. The majority of these headwaters are located within Hickory Flats WMA and the project itself lies within May Prairie State Natural Area. Silt loam soils within the site will likely facilitate rapid vegetation establishment increasing short-term and long-term bank and floodplain stability. Therefore, upstream development and negative impacts that could affect project success are unlikely to occur. These factors combined with the natural resource management plan give the TSMP a high level of confidence in the probability of accomplishing an ecologically self-sustaining restoration project.

3.0 SITE PROTECTION INSTRUMENT

Site protection for the project will be provided in accordance with 33 CFR 332.7(a)(1) which allows for long-term protection on governmental lands to be provided through a natural resource management plan. The plan for the project site is attached in Appendix B and provides for the long-term protection and management of the entire property. The plan is consistent with the long-term management and protection goals of the TSMP. In addition, a Memorandum of Understanding was executed with the State of Tennessee and can also be found in Appendix C.

4.0 BASELINE INFORMATION

4.1 Watershed Description

The project site is located in a rural setting within the Level III Ecoregion 71, Interior Plateau. The local watershed is part of the Upper Duck River 8-digit HUC (06040002). The drainage area of the project stream is approximately 0.7-square miles (437 acres) at the downstream project limits. Guthrie silt loam is the dominant soil type within the project limit. Land use/land cover in the contributing drainage area is dominated by forest (76%). The remainder of the watershed is comprised of pasture/grasslands (12%), low-density residential (7%), and row crops (5%). There is a negligible amount of impervious surface in the watershed.

4.2 Historic and Existing Hydrology

Historically, site hydrology supported wet meadow and flat woods ecosystems with shallow, low gradient surface drainage features and interspersed wetlands and upland areas. Ditching, pond creation and road development have significantly altered the hydrology of the site. As a result the site and intermittent project stream currently exhibit a lowered water table, a lack of natural stream features and a corresponding shift in the vegetative community.

Jurisdictional Determination Forms for the project stream can be found in Appendix D, and Hydrologic Determination Data can be found in Appendix E.

4.3 Site Description

The project is located within the May Prairie State Natural Area near Manchester in Coffee County, TN (centroid 35.44665 N, -86.02039 W). Topographic and aerial maps, as well as representative photographs of the project site are included in Appendix F and G, respectively. This site is managed by the Tennessee Department of Environment and Conservation Division of Natural Areas as a Class II Natural-Scientific State Natural Area. The May Prairie Site is one of the State's most floristically diverse natural areas and contains populations of many plant species that are considered rare in Tennessee. The project stream will be restored through existing oak forest and prairie. The project includes approximately 4,225 linear feet of 1st order stream. In the wet oak forest, the stream flows through a ditched channel and then becomes diffuse and braided as it continues to flow west until it reaches U.S. 41. At this point the stream runs northwest in the mowed roadside ditch. The stream runs approximately 1,375 ft before turning north and leaving the highway right-of-way near the project's end.

Due to past and ongoing manipulation, the stream does not clearly fit into one of the stages of the channel evolution model (Simon and Hupp, 1986). Since it is not in its natural state, but displays some stable characteristics, it is best described as being in Stage VI (quasi-equilibrium). Existing stream types include C6/4 and DA6/4. The Habitat Assessment Score of the stream is 95, which is 68% of the reference condition of the Interior Plateau. The Pfankuch rating is Good-Fair. The BEHI rating is Low. The bank height ratios are close to 1.0 with minimal bank erosion but progressing vertical instability.

The project is not located within a mapped FEMA flood zone. There are no National Register of Historic Places listed or eligible properties affected by the implementation of this project (Appendix H). There are approximately 300 taxa of plants that have been recorded from the prairie and adjacent woods since the late 1940s. Of these the Tennessee Natural Heritage Program lists 32 species as state endangered, threatened or of special concern (Appendix I). There is also the potential that the federally endangered Indiana Bat (*Myotis sodalis)* occurs at the site (Appendix J).

5.0 DETERMINATION OF CREDITS/RELEASE SCHEDULE

The project has the potential to produce 3,328 credits as detailed below:

Reach	Existing Linear Footage	Mitigation Type	Proposed Linear Footage	Ratio	Stream Credits
Reach 1	725	Restoration	725	1.5:1	483
		Replacement	246	1:1	246
Reach 2	1,175	Restoration	1,175	1.5:1	783
		Replacement	335	1:1	335
Reach 3	950	Restoration	950	1.5:1	633
		Replacement	44	1:1	44
Reach 4	1,375	Restoration	1,206	1.5:1	804
Total	**4,225**		**4,681**		**3,328**

The TSMP proposes the following credit release schedule. As project milestones are reached, the TSMP will submit the appropriate documentation to regulatory agencies for confirmation of credit release.

May Prairie Credit Release Schedule	
Site Protection	10%
Permit Approval	15%
Record Drawings	25%
Monitoring Event 1	10%
Monitoring Event 2	10%
Monitoring Event 3	10%
Monitoring Event 4	0%
Monitoring Event 5	20%

6.0 MITIGATION WORK PLAN

Specifics regarding the approach and methods of work are detailed within this section and the attached plans (Appendix K) and technical specifications (Appendix L).

6.1 Approach Per Reach

The project consists of four reaches and the restoration concepts for each reach are described below.

Reach 1 (0.4 mi^2 drainage area) will be restored using a Priority II and I approach. The new channel will start at the culvert on the gravel road using a PII approach and meander through the forest transitioning to a PI approach. As the restoration transitions from PII to PI, the stream elevation will be raised relative to the adjoining land surface to reconnect the channel with the former floodplain at the

bankfull elevation. This work will produce a C-type channel with the appropriate dimension, pattern and profile. Reach 1 connects to Reach 2 at the eastern field edge where the prairie portion of this project begins.

The remaining sections of the project, *Reaches 2, 3, and 4,* will all be restored using a Priority I approach that produces a C-type channel with appropriate dimension, pattern, and profile with bankfull-floodplain connectivity.

Reach 2 (0.5 mi^2 drainage area) will starts at the existing tree line and meander through the prairie eventually reconnecting to the existing channel within the western tree line. The surface drains that were originally installed to drain the prairie will be intermittently filled as a part of this work. The seeding and vegetative establishment in disturbed areas will be coordinated with TDEC to complement the existing, native prairie community.

Reach 3 (0.6 mi^2 drainage area) begins as the stream enters the downstream wooded area. Channel form will match that of Reach 2. Where the stream becomes braided and diffuse, a primary channel will be constructed that will carry the base flow volume while still supporting floodplain access through the smaller, braided channels as this is typical of headwater wet forest communities. The stream will be directed away from U.S. 41 and meandered through the existing forest, with care taken to minimize impact to existing mature trees. Reach 3 ends at the point that flow enters the roadside ditch along U.S. 41.

Reach 4 (0.7 mi^2 drainage area) will be relocated from the roadside ditch along U.S. 41 and returned to a meandering planform within the wet forest to the northeast using the same restoration method as applied to Reach 3. A berm will be built to separate the roadside ditch from the restored channel within the forest in order to prevent stream flows from reconnecting with the roadside ditch. Near the end of the reach, the stream will be stepped down with grade control structures to match the existing grade of the incised stream at the end of the project.

6.2 Planting Plan

Throughout the project planting within the limits of disturbance will be coordinated with the TDEC Division of Natural Areas. Native woody and herbaceous species will be planted in areas where vegetation may have to be removed for construction access. The designed planform and proposed construction methodologies should minimize the removal of mature trees. As such, the majority of required planting will be along the banks with only supplemental planting occurring within the floodplain. Where necessary, tree and shrub species that are well adapted to the site will be planted during dormancy. Reach 2 will not be planted with woody vegetation except for meander bends. Disturbed areas within the floodplain will be planted with native herbaceous species found within the existing native prairie community. TDEC intends to maintain the tall-grass prairie ecosystem through the traditional management methods of mowing and prescribed burning.

6.3 Exotic/Invasive Species Control Plan

Extraordinary efforts will be made during construction to prevent the introduction of exotic and invasive species to the site. All construction equipment shall be sanitized prior to mobilization to the site. All vehicles, including trucks delivering materials, will be pressure washed at the staging entrance before entering the construction site. Upon completion of the project, TDEC Division of Natural Areas will be responsible for the control and management of exotic and invasive species, in accordance with the management plan (Appendix B).

6.4 Schedule and Sequence

Construction of the project should commence in the Fall of 2013, only after authorization from the appropriate regulatory authorities. It is anticipated that construction of the project should only take 15 weeks, barring extended periods of inclement weather or poor site conditions.

The proposed stream restoration will require the use of heavy equipment including, but not limited to: track hoe, mini excavator, low-ground pressure track truck and skid steer. Proper construction sequencing should minimize the amount of land clearing necessary to accomplish the restoration

In reaches 1, 2 and 4 the restored channel will be constructed off-line. Although the new stream channel for reaches 1 and 4 are located in forested areas, the proposed planform was selected to limit the removal of mature trees. Excavated soil will be temporarily stockpiled within the limits of disturbance until the constructed channel has been completed and stabilized before backfilling the old channel in select locations. The construction of reach 3 will be completed on-line. Although construction timing should reduce the likelihood of sustained stream flow, the construction may take place in flowing water. When working in the flowing water, the TSMP may utilize rock check dams and/or silt curtains to reduce sediment discharge downstream.

6.5 Conservation Area

May Prairie was designated in 1973 as a Class II Natural – Scientific Natural Area through legislation under the Natural Areas Preservation Act of 1971 (TCA. §11-14-101 *et seq.*). This classification is for "natural - scientific areas, which are areas associated with and containing floral assemblages, forest types, fossil assemblages, geologic phenomena, hydrological phenomena, swamplands and other similar features or phenomena which are unique in natural or scientific value and which are worthy of perpetual preservation." (TCA §11-14-105). The area is managed in accordance with the Rules for Management of Tennessee Natural Resource Areas (Chapter 0400-2-8) by the Tennessee Department of Environment and Conservation Division of Natural Areas.

7.0 PROJECT MAINTENANCE

The project objective is to restore the stream to a state of dynamic equilibrium, thereby balancing discharge, slope, sediment load, and sediment size. Stability is not defined as an absence of change, but rather stable patterns of variation. Newly restored streams often demonstrate some level of adjustment and sediment sorting. Over time, the restored stream channel should be self-sustaining and dynamic, capable of adjusting to changes in discharge and sediment supply while maintaining stability.

Maintenance may be required on any stream restoration project and should be expected to occur as a normal component of the project. Routine maintenance may require treatment to address isolated areas of bank stabilization, repair of in-stream structures, or excessive tree mortality. Through site inspections and formal monitoring events, the TSMP will document site conditions, evaluate changes, and determine if corrective actions are warranted. The TSMP intends to operate under original permit authorizations to carry out construction and routine maintenance when necessary. If it is determined that corrective action beyond routine maintenance is necessary in order to ensure project success, the TSMP will prepare and submit an Adaptive Management Plan to the DE and IRT. Adaptive Management is more thoroughly discussed in Section 11.

8.0 PERFORMANCE STANDARDS

Performance standards are used to assess whether the project is meeting its objectives. Appropriate performance standards include attributes that are objective and verifiable, with values based on reference conditions that also reflect the range of natural variability as a result of natural processes and anthropogenic disturbances. Initial performance standards with design-derived values for the project are attached as Appendix M.

Unforeseen site conditions or constraints may require minor design modifications during project construction. Such field changes may necessitate corresponding adjustments in performance standards. In such cases, the TSMP will include the final, modified performance standards with the record drawings upon completion of construction.

8.1 Morphology

The purpose of morphological monitoring is to evaluate the stability of the restored stream. Project-specific morphologic performance standards for the May Prairie stream restoration project will include the following parameters:

8.1.1 Dimension

A representative number of cross-sectional measurements will be collected to document channel dimension(s) throughout the project. If changes in dimension are observed, they will be evaluated to determine whether the adjustments are indicative of natural channel evolution, and movement toward stability (ecological potential), or whether those changes indicate movement towards an unstable condition.

8.1.2 Pattern

During the first monitoring event, measurements of restored channel pattern, to include belt width, meander length, and radius of curvature will be collected within the same section(s) surveyed for the longitudinal profile(s). Calculations will be made of sinuosity, meander width ratio, radius of curvature/bankfull width ratio, and meander length/bankfull width ratio.

8.1.3 Profile

Slope has a major influence on stream channel morphology, sediment/bedload, hydraulic, and biological functions. Water surface slope is most accurately determined through longitudinal surveys. Longitudinal profile data will be collected on representative stream reaches to document water surface slope, average facet slopes, and pool to pool spacing. Although slight variances in stream profile over time should be expected, pools should maintain their depth with flatter water surface slopes, while riffles should remain shallower and steeper.

8.2 Hydrology (Stage Discharge)

Documenting peak stage discharge for the restored stream is another method to assess or analyze the appropriateness of the design discharge for the channel. The occurrence of stream flows meeting and/or exceeding the designed bankfull stage will be evaluated during each monitoring event, using collected data or visual observations.

8.3 Vegetation

The purpose of vegetation monitoring is to document planted and volunteer native woody species survivorship and composition, herbaceous ground coverage and invasive species occurrence. For the May Prairie Stream Restoration Project, the vegetative monitoring will be modified to coincide with the modified planting plan. In general, vegetative monitoring will consist of documenting the percent bare ground coverage.

8.4 Channel Stability (Bed and Bank)

The Pfankuch Channel Stability Evaluation will be used to evaluate the upper and lower banks and streambed for evidence of instability. The use of toe and bank pins and bar material bulk sampling may be required on a project-specific basis to facilitate more detailed evaluation of bed and bank stability.

8.5 Habitat

The applicable EPA Rapid Bioassessment Protocol Habitat Assessment Form will be used to evaluate each project reach prior to restoration. The project will be evaluated again using the same protocol during the final monitoring event. It is

expected that the habitat score for the restored reach should be greater than 75% of the median ecoregion reference reach.

9.0 MONITORING REQUIREMENTS

The TSMP is responsible for monitoring projects to determine and document the success of a project based upon the established performance standards. For the May Prairie Stream Restoration Project, monitoring will be conducted by the TSMP for a minimum of five years, or until regulatory agencies determine that the established performance standards have been met. All monitoring will be conducted using the procedures set forth in the TSMP Monitoring Protocol. Monitoring reports should be submitted to the regulatory agencies and IRT by October 31 after each monitoring event.

	Qualitative Visual Assessment	Photo Documentation	Vegetation	Morphology	Stability	Hydrology	Habitat Assessment
Monitoring Event 1	X	X		X	X	X	
Monitoring Event 2	X	X	X	X	X	X	
Monitoring Event 3	X	X	X		X	X	
Monitoring Event 4	X	X			X	X	
Monitoring Event 5	X	X	X	X	X	X	X

For the purpose of monitoring Reach 1 will be referred to as *Reach A*, Reach 2 will be referred to as *Reach B*, and Reaches 3 and 4 will be combined to make up *Reach C.*

10.0 LONG TERM MANAGEMENT PLAN

Upon successful completion of the monitoring period, the Tennessee Department of Environment and Conservation's Division of Natural Areas will be responsible for the long-term management of the site, in accordance with the Natural Resource Management Plan and the Memorandum of Understanding between TSMP and TDEC (attached in Appendices B and C).

11.0 ADAPTIVE MANAGEMENT PLAN

Adaptive management is a management strategy that anticipates likely challenges associated with compensatory mitigation projects and provides for the implementation of actions to address those challenges, as well as unforeseen changes to those projects. It requires consideration of the risk, uncertainty, and dynamic nature of the compensatory mitigation projects and guides modifications of those projects to optimize performance. It includes the selection of appropriate measures that will ensure that the aquatic resource functions are provided and involves analysis of monitoring results to identify potential

problems of a compensatory mitigation project and the identification and implementation of measures to rectify those problems.

Should any portion or aspect of the project not meet the specified performance standards based upon monitoring reports and/or additional visual observations in a monitoring year, the TSMP will investigate and document the nature and cause(s) of the resulting conditions. If it is determined that corrective action is not warranted, the rationale for such a decision shall be stated. Continued monitoring of the condition or area, including the use of more detailed methodologies and at a more intensive rate, may be necessary. These actions shall also be documented. In instances where corrective action is warranted and approaches beyond the scope of routine maintenance are deemed necessary to ensure project success, an Adaptive Management Corrective Action Plan shall be prepared. This plan will include a description of the areas of concern, proposed courses of action, an adjusted project schedule, including monitoring period, revised performance standards, and predicted changes to credit generation, if applicable.

12.0 FINANCIAL ASSURANCES

The TSMP has been operating as an In-Lieu-Fee program in Tennessee since 2003. With a decade of experience in stream restoration, the TSMP has completed 26 stream restoration/enhancement projects, totaling more than 232,000 linear feet, and producing 142,000 stream mitigation credits. The TSMP's rigorous project management process was developed based on the program's experience in the identification, development and implementation of stream mitigation projects. As a result, the TSMP builds project-specific budgets that include realistic costs for project development, design, implementation, maintenance, monitoring, long-term management, as well as a contingency based on uncertainties and risk analysis. In accordance with the TSMP In-Lieu-Fee Instrument, the TSMP commits to fund the May Prairie Stream Restoration Project until performance standards are satisfied and credits have been released. Should the project exceed our anticipated costs, the TSMP has the ability to adjust the credit fee schedule for future impacts, if necessary, to ensure that sufficient funding is available to fulfill its mitigation obligation.

Appendix A
Initial USACE Review Letter

DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
3701 BELL ROAD
NASHVILLE, TENNESSEE 37214-2660

January 16, 2013

REPLY TO
ATTENTION OF:

Regulatory Branch

SUBJECT: File No. LRN-2012-01092, Tennessee Stream Mitigation Program (TSMP) Initial Review of the May Prairie Stream Restoration Project Mitigation Proposal

Mr. Joey Woodard
Tennessee Stream Mitigation Program
5000 Linbar, Suite 275
Nashville, Tennessee 37211

Dear Mr. Woodard:

This is in regard to your project titled: May Prairie Stream Restoration Project Mitigation Proposal (TSMP Project No. 02-004-04). The project would be located within the May Prairie Natural Area near Manchester in Coffee County, TN (Latitude 35.44665 North, Longitude -86.02039 West).

The proposal states that the project has the potential to produce 2,879 credits. Credits would be derived by restoration activities along 4,205 linear feet of an unnamed tributary of Hunt Creek and reestablishment of an additional 76 linear feet of stream. Site protection would be provided through a natural resource management plan since the site is under State of Tennessee ownership as part of the May Prairie Natural Area. The TSMP intends to execute a Memorandum of Understanding with the State of Tennessee before commencing with the design of the restoration project.

A site visit was conducted on October 23, 2012, to review the mitigation proposal. In addition to the TSMP and U.S. Army Corps of Engineers (Corps), the following Interagency Review Team (IRT) agencies attended the site visit: U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (USEPA), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC). During the meeting, additional information pertaining to the stream designations was requested by TDEC. TSMP subsequently provided the information.

We sent an email to IRT agencies on December 17, 2012 soliciting initial comments. No comments have been received. Based on the initial IRT review, analysis of the May Prairie Stream Restoration Project Mitigation Proposal and communications made during the site visit,

the Corps is in support of this project. We request that TSMP submit a completed "Approved Jurisdiction Determination" form (AJD) for our review and documentation of the stream designation. We also ask that TSMP recognize the uncertainty that the 756 linear feet identified as Reach 3 may not warrants a restoration type that would generate a 1.5:1 credit ratio as identified in the proposal.

If you have any questions, please contact Mr. Marty Tyree at (615) 369-7514 or me at (615) 369-7512.

Sincerely,

Tim Higgs
Acting Chief, Eastern Regulatory Section
Operations Division

Appendix B
May Prairie State Natural Area
Management Plan

MAY PRAIRIE STATE NATURAL AREA
MANAGEMENT PLAN

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NATURAL AREAS PROGRAM

revised
February, 2012

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MAY PRAIRIE STATE NATURAL AREA
MANAGEMENT PLAN

I. INTRODUCTION

A. Guiding Principles

1. Maintain values as a Tennessee Department of Environment and Conservation Class II Natural-Scientific Natural Area.

2. Restore and maintain ecological integrity of the natural area at a landscape scale within the context of the Eastern Highland Rim Barrens and surrounding adjacent lands.

3. Provide and maintain reasonable, safe public access to the natural area for passive intermittent and semi-supervised day-use educational opportunities and botanical forays.

B. Significance

May Prairie is a 250-acre natural area located in Coffee County in Middle Tennessee, approximately 113 km (70 miles) southeast of Nashville near the town of Manchester. May Prairie lies within the Interior Low Plateau (ILP), in the southern part of Tennessee's Eastern Highland Rim (Fenneman 1938), in a distinctive area of the state known as "the barrens" (Shanks 1958) or "the oak barrens" (Patrick et al. 1983). These terms were used interchangeably by Gattinger (1901) in describing the region. As more detailed botanical and ecological studies were undertaken, "The Barrens" gained recognition for noteworthy occurrences of unusual native plant and animal species and plant communities (Svenson 1941, Shanks 1958, Patrick et al. 1983, DeSelm 1990, Clebsch and Pyne 1995), particularly at May Prairie and Arnold Engineering Development Center (AEDC).

The May Prairie barrens are included in the Eastern Highland Rim Prairie and Barrens Ecological System classification (NatureServe) in which globally rare community associations occur. May Prairie contains a wet to mesic tallgrass prairie and a drier short grass prairie. Though several examples of similar plant communities have been reported from Tennessee (DeSelm, 1978), no other site approaches May Prairie's size or ecological integrity.

Dominant grasses here include switch grass (*Panicum virgatum*), Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), and little bluestem (*Schizachyrium scoparium*). Important forbs include narrow-leaved sunflower (*Helianthus angustifolius*), wrinkled-leaved goldenrod (*Solidago rugosa*), prairie dock (*Silphium pinnatifidum*), and sneezeweed (*Helenium autumnale*). The prairie occurs on level to gently sloping topography over silt loam soils underlain by fragipan (fragiaquult).

Of the approximately 300 taxa of plants recorded from the prairie and adjacent woods since the late 1940s, 32 are listed as endangered, threatened, or of special concern by the

Tennessee Natural Heritage Program. The site also is significant for the numerous rare plants that are disjunct from the Coastal Plain or otherwise rare in the state.

Coastal Plain disjunct species include snowy orchid, *Platanthera nivea (state endangered)* and coastal false asphodel, *Tofieldia racemosa* (state endangered). Other coastal plain rare species include: needle leaf rosette grass, *Dicanthelium aciculare, rough panic grass, Dicanthelium leucothrix* (state special concern), *swamp lousewort, Pedicularis lanceolata, loosehead beak sedge, Rhynchospora chalarocephala* (state special concern), low nut rush, *Scleria verticillata* (state special concern), zig zag bladderwort, *Utricularia subulata* (state threatened), and pine barren death camas, *Zigadenus leimanthoides*(state threatened). One rare coastal plain disjunct land snail, the rockpile liptooth (*Daedalochila auriformis*), also occurs at the site.

C. Management Authority

May Prairie is administered and managed by the Tennessee Department of Environment in the Division of Natural Areas – TN Natural Areas Program (TNAP), L&C Tower Annex, 7th Floor, 401 Church Street, Nashville, TN 37243. The Tennessee Wildlife Resources Agency (TWRA) Region 2 Office [Middle Tennessee], Ellington Agricultural Center, P.O. Box 41489, Nashville, TN 37204) is responsible for game management on the Hickory Flats WMA which includes all but 82 acres of May Prairie.

II. DESCRIPTION

A. Statutes, Rules, and Regulations

May Prairie was designated in 1973 as a Class II Natural – Scientific Natural Area through legislation under the Natural Areas Preservation Act of 1971 (TCA. §11-14-101) This classification is for "natural - scientific areas, which are areas associated with and containing floral assemblages, forest types, fossil assemblages, geologic phenomena, hydrological phenomena, swamplands and other similar features or phenomena which are unique in natural or scientific value and which are worthy of perpetual preservation." (TCA §11-14-105). The area is managed in accordance with the Rules for Management of Tennessee Natural Resource Areas (Chapter 0400-2-8).

B. Project History Summary

The prairie was first "discovered" in 1947 by botanists Drs. Royal Shanks and Jack Sharp from the University of Tennessee at Knoxville. During the late 1940s and in subsequent years, numerous plant collections were made in the prairie openings and adjacent thickets and forest. Herbarium records from those early years label the site as the Manchester Prairie. During this time Sharp and others were traveling the state in an attempt to replenish collections at the UT herbarium destroyed by fire in the late 1920s which resulted in a loss of a vast number of herbarium specimens. The story goes that they were driving down U.S. 41 on the 4th of July in 1947 and stopped at the Prairie Café. While there, they asked about the name and were told that it was named for the prairie behind it.

In 1971, Dr. Catherine Keever recommended May Prairie for National Natural Landmark status by the National Park Service. It was designated a Class II State Natural Area in 1973

and designated as National Natural Landmark in 1974. The prairie was named in honor of Mrs. David (May) King, whose father, A. M. May, was a former owner of this tract. The State purchased most of the land from Dave King.

The first tract purchased was 82 acres by TDEC in 1975. This is referred to as the May Prairie tract and it includes approximately 14 - 16 acres of the original prairie (west and northwest lobes of the prairie). The second tract acquired was 58.5 acres, referred to as the Haggard tract (formally owned by Dave King) and was purchased by TWRA from Woodrow Haggard in 1989. It includes approximately 8 – 12 acres of the original prairie (east to northeast lobes of the prairie). The third tract purchased was approximately 837 acres by TWRA in 1995. It is referred to as the King tract and it includes approximately 10 -12 acres of the original prairie (northeast lobe, north of Haggard).

Approximately 600 acres of the King tract purchased is northwest of Asbury Rd and not contiguous with May Prairie but is part of the Hickory Flats WMA. The WMA is on both sides of Asbury Road, and includes a fourth tract, approximately 200 acres of TWRA property, southeast of Asbury Rd and east of the natural area. The 250 acre natural area is comprised of the TDEC property, the Haggard tract, and the King tract on the southwest side of Asbury Rd.

There are several events that have impacted the prairie since its discovery in 1947. They include alteration of the hydrology as a result of the Tennessee Department of Transportation (TDOT) putting in a ditch along U.S. 41 in the mid 1950's. Hydrology was altered by Haggard when he drained his property by channelizing Hunt Creek, putting in lateral ditches, and creating a pond where an intermittent stream called the prairie tributary, flowed through the northeast and east lobes of the prairie into Hunt Creek. Then, in the absence of management on the King tract while the land remained in probate, an abundant growth of a red maple created a "dog haired thicket" where the north lobe extends from the Haggard tract north boundary into the south end of the King tract.

This conversion from grassland to maple thicket also influenced hydrology by increasing biomass and trans-evaporation of water from the wetland through the trees. Also, an ancillary impact occurred in the early 1970s with the sale of a tract from AEDC property adjacent to May Prairie south of U.S. 41. This sale was controversial and opposed by conservation organizations, particularly the Tennessee Conservation League (now the Tennessee Wildlife Federation). It is likely that barrens in close proximity to May Prairie were destroyed. AEDC is a noteworthy site for numerous significant barrens.

As result of the additions of the Haggard and King tracts since TDEC's original acquisition, the natural area has undergone significant management for prairie restoration including prescribed burning, red maple control, invasive exotic species control, and hydrological restoration (to a limited extent).

C. Natural Resource Assessment

1. Description of the Area -

General Description:

The following discussion provides a general description of features at May Prairie and the major influences that affect the function of the plant associations in this Eastern Highland Rim Prairie and Barrens ecological system.

Topography and Hydrology: The prairie occurs on the level to gently sloping topography over silt loam soils with fragipan (fragiaquult). Sometime during the 1950s, a large drainage ditch was dug on the north side of U.S. 41 along the southwest edge of the prairie. It has been theorized that this ditch increased runoff from the prairie, which resulted in the prairie being drier in the wet winter and spring months. This drying trend allowed for the establishment of hundreds of red maple and sweetgum seedlings (pers. communication with Hal DeSelm). Not only have the seedlings become established on the prairie proper, but continual invasion from the edge has been occurring. The post oak – blackjack oak flatwoods on the inner edge of the "horseshoe" were quite sparse according to the 1964 aerial photography. The extent of the wet red maple-willow oak-sweetgum woods on the south side of the prairie was very limited in the 1964 aerial photo, with few trees between the prairie and U.S. 41.

Soils: The different soil types are one of the predominant controllers of plant communities at May Prairie. Soils of the prairies belong to the Dickson-Montview-Lobelville soil association, which is the most extensive Coffee County soil. The major soil series found here are the Guthrie, Lawrence, Dickson, and Sango soils. These four soil series together cover almost 30% of Coffee County. Each of these soils is formed from a thin layer of loess-like silt overlying residuum from cherty limestone (Love et al. 1959).

The Guthrie soil series underlies the greatest acreage of open prairie at May Prairie. This series consists of poorly drained soils with a grayish, very friable to friable silt loam surface soil. A discontinuous compacted layer or fragipan underlies the subsoil. The Guthrie silt loam soils occur at approximately 1070 feet elevation and are found along drainageways at May Prairie. Both open prairie and adjacent woodland occur on this soil. The soil here has very slow surface runoff and very slow internal drainage. When rainfall is abundant, these soils may be saturated or flooded for long periods of time. During dry spells the subsoil becomes hard or compacted, and there is little or no plant root development below the fragipan.

The Lawrence series is very similar to that of the Guthrie series. The Lawrence series is somewhat poorly drained - slightly better drainage than the Guthrie series and also possesses a fragipan in the subsoil. Surface drainage in many places is very slow, and in some places the soil becomes ponded by water. At May Prairie, this series occupies slightly higher areas adjacent to the drainageways. From the 1940 aerial photo of May Prairie, the Lawrence series supported open prairie as well as forested areas, but today nearly all of the Lawrence series here supports forest growth.

The third soil series of importance at May Prairie is the Dickson series, a moderately well-drained soil of uplands. Both the Dickson silt loam gently sloping phase and eroded, gently sloping phase can be found at May Prairie. The two phases of this soil type occupy an approximately oval area at the highest elevation in the area (i.e., 1090 ft). These two phases occur in approximately

equal proportions, the difference being that one has been cleared of forest and was temporarily in agricultural which resulted in some surface erosion. These Dickson soils possess slow to medium surface runoff, and internal drainage is medium to slow. Permeability is moderate in the surface soil and moderately slow in the subsoil. A fragipan of weak to strong development is present and most frequently occurs 26 to 28 inches beneath the soil surface.

Vegetation: The vegetation at May Prairie can be divided into two broad types, grassland and forest, and then further divided into plant associations. There is however, a gradient in vegetation at May Prairie where a grassland and open canopy forest result in a post – oak grassland association. The original open grassland prairie was approximately 36 acres. However, the total barrens vegetative coverage was likely greater when considering the possibility of an oak barrens component, much of which has been altered from decades of fire suppression resulting in increased canopy coverage.

It is the grassland with vestiges of oak barrens that are of greatest significance. To the untrained eye, the prairie may not appear significant since its vegetation is a mixture of grasses and forbs superficially not unlike an old field. One of the dominant prairie grasses, little bluestem, is quite similar, both in terms of taxonomy and appearance, to the common broomsedge that is widespread in old-fields.

Vegetation sampling conducted in 1981 and 1982 revealed that dominant grasses include switchgrass (*Panicum virgatum*), Indian grass (*Sorghastrum nutans*), little bluestem (*Schizachyrium scoparium*) and big bluestem (*Andropogon gerardii).* Dominant forbs sampled in the late summer include narrow-leaved sunflower (*Helianthus angustifolius*), prairie dock (*Silphium pinnatifidum),* and sneezeweed (*Helenium autumnale*). Of the species sampled in 1981 and 1982, forbs were approximately twice as abundant as grasses and grass-like species.

The prairie is surrounded by forest of varying age and composition. Between the prairie and U.S. 41, and at other areas surrounding the prairie, young stands of swamp forest dominated by red maple, sweetgum, and willow oak have replaced prairie. Mature swamp forest associations do occur in the natural area beyond the prairie. Bordering the north central portion of the prairie (west lobe) is a strip of xeric blackjack oak- post oak forest which grades into a more diverse southern red oak woods with mockernut hickory, post oak, sweetgum, and blackgum. This is where vestiges of a post oak barrens association occur that are undergoing restoration.

Fauna: Comparatively little is known about the animals that inhabit May Prairie. Numerous sightings, beaten paths and bedding sites on the prairie reflect the high use of the area by white-tailed deer. One attempt at trapping the area by TDEC yielded the disappointing catch of only one white-footed mouse from more than 50 live traps set in 1982. After a March 1983 prescribed burn, several crayfish burrows and trails burrowed under the fallen grasses and resting areas for unidentified small mammals were found. Further trapping conducted by TWRA in 2006 revealed the presence of two small mammals considered "Deemed in Need of Management" by the Agency. A 2007 examination of crayfish burrows by Roger Thoma of the Midwest Biodiversity Institute resulted in the collection of

a possibly undescribed form of the ambiguous crayfish (*Cambarus striatus*). A charred but live hispid cotton rat (*Sigmodon hispidus*) was observed by TDEC staff following a 1990s prescribed fire.

Four rare animals are known from May Prairie: four-toed salamander (*Hemidactylium scutatum*), cinereus shrew (*Sorex cinereus*), southeastern shrew (*Sorex longirostris*), and the rockpile liptooth (*Daedalochila auriformis*) Additionally, the mole salamander (*Ambistoma talpoidium*), which inhabits wet woods that often are ponded in winter and spring months, may occur in the swampy forest adjacent to the prairie. Additionally, various organizations have inventoried birds (AEDC zoologists), mammals (TWRA), and butterflies (North American Butterfly Association).

2. Description of Threats –

Invasive Species – Invasive exotic plants pose a significant threat to May Prairie. Although present impacts are relatively minimal, stiltgrass (*Microstegium vimineum*), hairy joint grass (*Arthraxon hispida*), and sericea lespedeza (*Lespedeza cuneata*) are management issues in the prairie, and their control is of considerable importance in accomplishing restoration. The former two are annual grasses which are management challenges, particularly because of their potential impact to a grassland ecosystem. Sericea lespedeza is a problem on the Haggard tract, and until it is controlled, it will continue to thwart the use of fire since fire facilitates its spread.

Stiltgrass occurrences are localized (and not widespread) to open grassland conditions mostly on the Haggard tract, and occur to a much lesser extent on the King tract, where red maples have been removed. It occurs on the May Prairie tract near U.S. 41 where red maple, sweetgum, etc. have succeeded the barrens and in the vicinity of a braided creek drainage associated with Hunt Creek. It also is found in forested areas following disturbances caused when hard prescribed burn lines were established in the mid 1990's. This includes the fire line that sometimes is used as a rudimentary trail that connects to the small parking area on Asbury Rd. Stiltgrass has been managed in select areas using herbicide and a weedeater since the late 1990's.

Hairy joint grass (*Arthraxon hispida)* occurs in open grassland conditions mostly on the Haggard tract. However, it has been identified encroaching into the pristine barrens on the southeast corner of the May Prairie tract. There has not been a management strategy devised for this plant for May Prairie. Fluctuating annually, its colony size is influenced by drought or abundant precipitation. The biology of this plant and its management are not well documented.

Sericea lespedeza (*Lespedeza cuneata*) is contained within the more disturbed areas of the natural area almost exclusively on the Haggard tract. A few plants occasionally have been observed and removed in the May Prairie tract. Control of this species is critical to enable fire to be effectively used on the Haggard tract.

Other plants species listed as invasive exotic pests by the Tennessee Exotic Pest Plant Council (TN-EPPC) include mimosa (*Albizia julibrissin*), privet (*Ligustrum*

spp.), and Japanese honeysuckle (*Lonicera japonica).* Privet is primarily located along the forest edge along U.S. 41 and has become a focus of eradication.

Purple loosestrife (*Lythrum salicaria*) does not occur in the natural area but it is in the ditch on the south side of U.S. 41. Its close proximity to May Prairie is a major concern since it poses a significant threat to the natural area if established. Its occurrence was reported to the TNAP in 2010. Since then TNAP has worked with TDOT in an effort to eradicate it. Hopefully, with this early detection and rapid response, its eradication is possible.

Although exotic plant species are a serious concern, native woody species, particularly red maple are the greatest management issue in the natural area. Control of red maple is dependent on fire and herbicide application, but hydrological restoration (raising the water table) may significantly aid in controlling it and other woods species. Sweetgum and osier dogwood are other native woody species managed for the same reason. They are troublesome but much less aggressive than red maple. Management of these species is on-going through a combination of prescribed burning, bushhogging, and herbicide application. As of 2011, preliminary indications are that a management regime of prescribed burning, followed by bushhogging and stem herbicide treatment is reducing woody species invasion. Use of this treatment regime is on-going and conclusive results are pending further application and monitoring.

Development: The State has effectively acquired more than 1,000 acres for conservation purposes that include May Prairie State Natural Area since 1975. The surrounding landscape, however, has undergone a significant change over the past several decades. In the 1990s approximately 30 – 40 acres of farmland contiguous to May Prairie beginning at the intersection of Asbury Rd and U.S. 41 were purchased and converted to a used auto parts lot. More recently 405 acres of farmland contiguous to May Prairie and Hickory Flatwoods to the north have been acquired for development as an industrial park. TWRA intended to purchase this property but was unsuccessful because Coffee County chose it for an industrial park. TDEC and TWRA have consulted with the industrial park representatives regarding issues concerning its footprint and potential impact on the state owned lands. In addition, the county plans to build a new courthouse and jail across from May Prairie on the south side of U.S. 41.

These recent and planned developments, in addition to the conservation lands lost in 1970's (AEDC), have affected the context of the May Prairie landscape. The gravest concerns these changes create is the potential effect on hydrology and the potential effect of management related to prescribed burning because of smoke management issues.

Altered Hydrology: The Tennessee Stream Mitigation Program (TSMP) will begin mitigation or restoration of May Prairie hydrology in 2012. The goal is to raise the water table of the natural area. This will be accomplished by recontouring Hunt Creek, closing and filling ditches, eliminating the pond, and diverting water back onto May Prairie where it presently drains into the ditch along U.S. 41. The hydrological restoration plan will be included as an appendix when it becomes available.

Fire Suppression: In 2000, Brown and Smith noted that "one of the most significant changes in land use in the 1900s was the suppression of wildfires. Fire suppression has led to changes in species composition and vegetation structure." Brown and Smith note the following in regard to prairie communities: a primary effect of fire in tallgrass prairie ecosystems is the control of invading woody species (Anderson and Van Valkenburg 1977; Wade and Menges 1987). The rapid conversion from prairie to forest with the removal of fire was noted in the early 1800s. Muir (1965) observed in Wisconsin that as soon as sufficient firebreaks were created, a thick oak forest invaded the prairie. In 1822, botanist Edwin James reported, "Whenever the dominion of man is sufficiently established in these vast plains, to prevent the annual ravages of fire, trees will spring up" (Pyne 1997)".

This is readily observed in the library of aerial photography from May Prairie and the surrounding area (e.g. AEDC) dating back to the 1930s. Woody species like red maple and sweetgum have invaded the site as a function of fire suppression and altered hydrology. Future maintenance of the prairie will be required on an annual basis to prevent the deleterious competition from woody species that are threatening the prairie. Fire and mowing will be used interchangeably to manage this threat.

Poaching: Presently, plant poaching is not a concern, but could become an issue as more people discover the location and plant diversity of May Prairie. The potential for digging plants from this site is important to recognize since it contains species not found elsewhere in the state. Furthermore, even the non-listed prairie plants may prove very desirable to those interested in cultivating native species. May Prairie's close proximity to McMinnville, a major commercial nursery center, is noteworthy because the nurseries there are a major source of plants for retailers and landscapers nationwide. Hypothetically, plants illegally dug from May Prairie could provide a significant propagation source for the nursery trade.

D. Cultural Assessment

Early land surveyors in Coffee County noted the existence of what is now called the May Prairie and referred to it then as "the old perarie (sic)" in 1807. It is reported that this site was a stopping place for travelers on the old Nickajack Trace, a portion of which is still visible on aerial photographs of the area. The old Nickajack Trace was initially a native American game trail which roughly approximates the current path of U.S. 41.

E. Agricultural Land Use

The historic land use in the vicinity has primarily been agricultural mixed with small areas of residential development. Some agricultural lands in the area have been converted for other uses (as described above). This is the likely trend as Manchester continues to expand southeast along U.S. 41.

F. Target Elements

1. Communities

a) ***Andropogon gerardii - Schizachyrium scoparium - Dichanthelium scoparium Rhynchospora glomerata*** **Herbaceous Vegetation, Translated Name:** Big Bluestem - Little Bluestem - Broom Witchgrass - Clustered Beaksedge Herbaceous Vegetation, **Common Name:** Highland Rim Wet-Mesic Prairie, **Unique Identifier:** CEGL004006, Global Rank: G1

b) ***Schizachyrium scoparium - Panicum anceps - Panicum virgatum - Lespedeza capitata - Scleria*** **spp. Herbaceous Vegetation, Translated Name:** Little Bluestem - Beaked Panicgrass - Switchgrass - Roundhead Bushclover - Nutrush species Herbaceous Vegetation, **Common Name:** Highland Rim Dry-Mesic Prairie, **Unique Identifier:** CEGL004063, Global Rank: G1

c). ***Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum*** **Forest, Translated Name:** Southern Red Oak - White Oak - Mockernut Hickory / Sourwood / Deerberry Forest, **Common Name:** Southern Red Oak - White Oak Mixed Oak Forest, **Unique Identifier:** CEGL007244, Global Rank: G4G5. (This association needs confirmation and/or refinement at May Prairie, Personal communications with Kevin Fitch).

d) ***Quercus (falcata, stellata) / Quercus marilandica / Gaylussacia (baccata, dumosa)*** **Woodland, Translated Name:** (Southern Red Oak, Post Oak) / Blackjack Oak / (Black Huckleberry, Dwarf Huckleberry) Woodland, **Common Name:** Southeastern Highland Rim Blackjack Oak Barrens, **Unique Identifier:** CEGL004922, Global Rank G2G3. (This association needs confirmation and/or refinement at May Prairie, Personal communications with Kevin Fitch).

e). ***Quercus stellata - (Quercus coccinea) / Quercus marilandica / Vaccinium pallidum - (Vaccinium stamineum)*** **Woodland, Translated Name:** Post Oak - (Scarlet Oak) / Blackjack Oak / Hillside Blueberry - (Deerberry) Woodland, **Common Name:** Southeastern Highland Rim Post Oak - Blackjack Oak Woodland, **Unique Identifier:** CEGL004709, Global Rank: G2G3. (This association needs confirmation and/or refinement at May Prairie, Personal communications with Kevin Fitch).

f). ***Quercus phellos - Quercus alba / Vaccinium fuscatum - (Viburnum nudum) / Carex (barrattii, intumescens)*** **Forest, Translated Name:** Willow Oak - White Oak / Black Highbush Blueberry - (Wild Raisin) / (Barratt's Sedge, Bladder Sedge) Forest, **Common Name:** Barrens Depression Willow Oak Forest, **Unique Identifier:** CEGL007364, Global Rank: G2. (This association needs confirmation and/or refinement at May Prairie, Personal communications with Kevin Fitch).

G). ***Liquidambar styraciflua - Acer rubrum / Carex*** **spp.** ***- Sphagnum*** **spp. Forest, Translated Name:** Sweetgum - Red Maple / Sedge species - Peatmoss species Forest, **Common Name:** Upland Sweetgum - Red Maple Pond, **Unique Identifier:** CEGL007388, Global Rank: G2?. (This association needs confirmation and/or refinement at May Prairie, Personal communications with Kevin Fitch).

4. Species

Scientific Name	Common Name	Federal Status	State Status	State Rank	Global Rank
Agalinis oligophylla	Ridge-stem False-foxglove		E	S1	G4
Aster pratensis	Barrens Silky Aster		T	S1	GNR
Drosera brevifolia	Dwarf Sundew		T	S2	G5
Eryngium integrifolium	Blue-flower Coyote-thistle		T	S1	G5
Eupatorium leucolepis	White-bracted Thoroughwort		E	S1	G5
Festuca paradoxa	Cluster Fescue		S	S1	G5
Fimbristylis puberula	Hairy Fimbristylis		T	S1S2	G5
Gaylussacia dumosa	Dwarf Huckleberry		T	S3	G5
Gymnopogon brevifolius	Broad-leaved Beardgrass		S	S1S2	G5
Isoetes melanopoda	Blackfoot Quillwort		E	S1S2	G5
Lathyrus palustris	Marsh Pea		S	S1	G5
Lespedeza angustifolia	Narrowleaf Bushclover		T	S2	G5
Lilium michiganense	Michigan Lily		T	S3	G5
Listera australis	Southern Twayblade		E	S1S2	G4
Lobelia canbyi	Canby's Lobelia		T	S2S3	G4
Lysimachia terrestris	Swamp Loosestrife		E	S1	G5
Panicum aciculare	Needleleaf Witchgrass		E	S1	G4G5
Panicum acuminatum var. leucothrix	Roughish Witchgrass		S	S1	G4?Q
Pedicularis lanceolata	Swamp Lousewort		S	S1S2	G5
Orchid Platanthera integra	Yellow Fringeless		E	S1	G3G4
Platanthera nivea	Snowy Orchid		E	S1	G5
Polygala nuttallii	Nuttall's Milkwort		E	S1	G5
Prunus pumila	Sand Cherry		T	S1	G5
Rhynchospora caduca	Falling Beaked-rush		S	S1	G5
Rhynchospora chalarocephala	Loose-headed Beakrush		T	S1	G5
Scleria verticillata	Low Nutrush		S	S2	G5
Silphium pinnatifidum	Southern Prairie-dock		T	S2	G3Q
Solidago gracillima	A Goldenrod		S	S1	G4?
Tofieldia racemosa	Coastal False-asphodel		E	S1	G5
Trillium pusillum	Least Trillium		E	S2	G3
Utricularia cornuta	Horned Bladderwort		E	S1	G5
Utricularia subulata	Zig zag Bladderwort		T	S1	G5
Hemidactylium scutatum	Four-toed Salamander		D	S3	G5
Daedalochila auriformis	Rockpile Liptooth		-	S1	G4
Sorex cinereus	Cinereus Shrew		D	S4	G5
Sorex longirostris	Southeastern Shrew		D	S4	G5

III. MANAGEMENT OF TARGET ELEMENTS FOR CONSERVATION

A. Natural Area Goals and Objectives

1. Provide Administrative Oversight Responsibilities
    a. Conduct annual (or as needed) management meetings with cooperators.
    b. Conduct regular site visits throughout the year.
    c. Conduct site visits when deemed necessary in response to reports of illegal activities, resource issues, and other public concerns.
        i. Document site visits as site visit reports and enter the report into the natural areas database.
    d. Develop an annual report addressing accomplishments for the year. The annual report is a summary of reports to the database and other information of importance. The previous year's report is entered in the database each February.
    e. Develop cooperative agreement with TWRA to determine hunting season and law enforcement in natural area.
2. Address Maintenance and Operational Needs
    a. Periodically inspect boundary markers to ensure that the boundary is clearly marked and that there have not been any illegal encroachments on the property.
        i. Resign and/or repaint the boundary when necessary.
        ii. Respond to illegal encroachments (such as vehicles entering the property or unapproved trails) as soon as possible, i.e. block an illegal entrance, add signs as needed, and initiate law enforcement if needed.
        iii. Coordinate with TWRA to address illegal activities resulting from hunting (ATVs and permanent tree stands).
        iv. Fence areas if appropriate to address specific encroachment.
        v. Put cable easement access at Willow Oak Rd.
        vi. Put cable across from easement and access opening to Haggard tract.
        vii. Remove tree stands.
    b. Conduct routine trash pick-ups in the parking area on Asbury Rd.
    c. Conduct routine maintenance of trails and make improvements as necessary.
    d. Monitor for vandalism. Repair and replace any damages caused by vandalism.
    e. Maintain public access as related to maintenance and operational needs.
3. Provide and maintain reasonable, safe public access to the natural area for passive intermittent and semi-supervised day-use educational opportunities and botanical forays.
    a. Update interpretive materials when necessary.
        i. Make appropriate edits and/or additions to the web page as needed.
        ii. Update maps as needed, e.g. trail maps.
    b. Undertake initiatives to increase public awareness and knowledge of the natural area.

i. Conduct hikes and other special events to increase public awareness, enjoyment, and knowledge of the natural area.

c. Provide opportunities for research in the natural area.
   i. Ensure that all researchers get the appropriate research permits from the Natural Heritage Program and other necessary departments or agencies before research begins.
   ii. Require that research results, i.e. scientific papers, floras, etc., be provided to the Natural Areas Program for entry in the natural areas database.

4. Manage the ecological and natural resources of the natural area in order to restore, maintain or improve these resources.
   a. Evaluate historic conditions to set restoration goals.
      i. Develop long-term management goals based on pre-1947 conditions determined by using aerial photos.
   b. Implement canopy thinning based on pre-1947 conditions.
   c. Continue prescribed burning.
      i. Burn regime is adaptive (annual or bi-annual).
      ii. Burn units may be adjusted.
      iii. Maintain burn lines.
   d. Restore hydrology.
      i. Implement TSMP plan (to be added to management plan when available).
   e. Continue to develop and implement management strategies to control or eradicate invasive pest plants.
      i. Continue work to eradicate and/or control microstegium on all tracts (Haggard, King, and May Prairie).
      ii. Continue to eradicate and or/control lespedeza in Haggard; immediately remove any plants observed in May Prairie.
      iii. Develop and implement management strategy to control hairy joint grass.
      iv. Eradicate privet along U.S. 41 and any observed in the natural area.
      v. Monitor purple loosestrife in ditch along U.S. 41 and continue to coordinate with TDOT for eradication.
      vi. Continue to develop and implement strategies to manage and control invasive native species, particularly red maple.
      vii. Document invasive species treatment methods and entered report into the natural area database.
      viii. Continue to survey and record occurrences and infestation levels of invasive species.
      ix. Continue to prioritize invasive species strategies based on current data, updated information, infestation levels, and threat assessments.
   f. Continue to complete an inventory of plants, animals, and ecological communities within the natural area to foster better management of natural and ecological resources.
      i. Update plant list.
      ii. Work with volunteers & students to create faunal lists.
      iii. Work with Natural Heritage to delineate and map communities.
      iv. Periodically monitor state listed species.

g. Work with the appropriate experts to identify emerging threats to the natural area and identify preventive actions to eliminate or mitigate each threat.
h. Work with adjacent landowners when necessary to mitigate external threats to the natural area.
i. Adapt management activities based on results. Management activities should be monitored for effectiveness. Management that does not provide the intended results or is deemed destructive to natural resources should be modified or stopped if necessary.

5. Adjacent use issues and critical land acquisition needs.
   a. Continue to be proactive in advocating for adding adjacent public land to the natural area.
   b. Continue to monitor development of the industrial park and other new development.

IV PUBLIC USE

May Prairie is currently a day-use natural area. It is a favorite location for botanists and rare plant enthusiasts. May Prairie is accessible via the parking area for Hickory Flat Woods WMA located on Asbury Road. The natural area is open daily dawn until dusk. Hiking and all other related activities including photography, birding, and organized interpretive hikes are permitted on trails. Off-trail activities can be conducted with approval of the State Natural Areas Program. Hunting is allowed on the WMA and all hunting activities must follow the requirements posted by TWRA. There is no hunting on the May Prairie tract. There are no permanent tree stands permitted on the natural area nor any ATV for hunting and any other purpose allowed.

The following public uses are prohibited because these activities cause damage to archeological, scientific, historical, or other significant resources, including rare natural features of interest for scientific study and/or because they conflict with passive use recreation activities or policy.

1. Horseback riding – Horseback riding is prohibited anywhere within the natural area. Horses can cause significant degradation of the natural resources within the natural area through dispersal of invasive exotic pest plants, increased soil erosion, trail damage (especially at switchbacks), trampling and loss of vegetation, soil compaction, alteration of wetland or bog areas, and decreased water quality.

2. Camping – Camping is not allowed anywhere on the property.

3. Bike riding – Mountain bike riding is prohibited anywhere within the natural area. Mountain bike riding can cause significant degradation of the natural resources within the natural area through increased soil erosion, trail damage, crushing and loss of vegetation, and soil compaction.

4. Motorized off-road vehicle riding (motorcycles, ATVs, go-carts, jeeps, etc.) – Use of motorized off-road vehicles is prohibited anywhere within the natural area. Motorized off-road vehicle riding can cause significant degradation of the natural resources within the natural area through increased soil erosion, trail damage, crushing and loss of vegetation, soil compaction, alteration of wildlife behavior,

alteration of wetland or bog areas, decreased water quality, and disruption of passive recreation activities.

5. Fires – The use of any fire, including campfires, is not permitted anywhere within the natural area except as conducted by staff according to an approved prescribed burn plan. Fire can cause significant degradation of the natural resources within the natural area through loss of vegetation, loss of wildlife, alteration of plant and animal population structure and community composition, loss of forest litter layer, alteration of the soil fertility, increased soil erosion, decreased water quality, and decreased aesthetics. Fires within the natural area may also pose a significant safety hazard to other visitors within the natural area and to neighboring residents. Fire and smoke may damage or destroy both private property and state owned structures.

6. Pets – No pets, leashed or unleashed are allowed at May Prairie State Natural Area.

7. Collection or destruction of plants, animals, minerals, or artifacts. The collection or destruction of any natural feature is not permitted anywhere within the natural area.

8. Consumption or possession of alcoholic beverages and controlled substances. The consumption or possession of alcoholic beverages, controlled substances, and other intoxicating drugs or chemicals is not permitted anywhere on the natural area.

V DEVELOPMENT AND MAINTENANCE

A. Parking

A gravel parking area is located at Asbury Road that accommodates approximately 4 cars. It is used for access to the natural area and for parking for hunting on the WMA. Trash pick-up and site visits will be periodically done by TDEC and TWRA. Appropriate signage will be maintained in the parking area.

B. Signs

A natural area entrance sign and TWRA WMA sign are in the parking area. Other signage in the parking area, including a kiosk may be added. Trail signage is minimal and needs improvement. Boundary signs need to be cooperatively maintained by TDEC and TWRA. Natural area signs need to be placed at key locations within the natural area. No hunting signs need to be posted on the TDEC tract.

C. Trails

May Prairie has had minimal trail development. The majority of the trail utilizes the permanent firebreaks and trails are minimally maintained. There are no trails maintained in the barrens. There is a short trail to the red maple restoration area connecting with the main trail in the forest. Future trail develop will be considered.

D. Boundary/ Site Patrol

Site patrol should occur on a frequent as possible basis by TDEC staff and TWRA staff. There is no scheduled regular site visitation. Day to day oversight is lacking.

E. Litter Removal

All litter and trash should be picked up as needed. Trash is mostly thrown out along Asbury Rd. or in the Asbury Rd. parking area. Trash dumping has not been a problem along the trail or in the barrens.

F. Adjacent Lands

May Prairie is surrounded by private property. It is mostly a mix of small farmland, residential development, and development previously discussed. The interface between private landowners and the State is important as it relates to prescribed burning and smoke management. It is likely that the isolated ATV use that has occurred here is caused by a local private land owner. It is important to increase the awareness of these private property owners about May Prairie.

VI EDUCATION AND RESEARCH

A. The Natural Areas Program will work with the Coffee County government to increase public awareness of the uniqueness and fragility of May Prairie SNA by promoting educational opportunities. The natural area provides an opportunity to demonstrate the importance of natural area values in a rapidly urbanizing area.

B. The Tennessee Native Plant Society conducts semi-annual visits to May Prairie. May Prairie SNA provide opportunities for botanical research as well as other research opportunities.

C. May Prairie is utilized for field trips for professional organization and schools in cooperation with TDEC.

VIII LIST OF APPENDICES

Natural Area Preservation Act of 1971
Rules of Tennessee Department of Environment and Conservation
Location map of May Prairie
List of Plant Species Documented at May Prairie State Natural Area

Appendix C
Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

Between the Tennessee Stream Mitigation Program (TSMP)
and the State of Tennessee Department of
Environment and Conservation (TDEC)

This Memorandum of Understanding is for the provision of constructing and protecting a stream mitigation project, including aquatic habitat restoration and native riparian corridor enhancement along the headwaters of Hunt Creek within the May Prairie State Natural Area (managed by TDEC through the Natural Areas Program) in Coffee County, TN.

The Tennessee Stream Mitigation Program (TSMP) agrees to:

1. Fund the assessment, development, design, permitting and construction of the proposed stream restoration project substantially as described in the mitigation proposal approved by TDEC's Natural Areas Program and the Interagency Review Team. The project shall be completed in accordance with the requirements of the TSMP's In-Lieu Fee Instrument and all applicable federal and state regulations.

2. Fund monitoring and any required maintenance of structures during the required monitoring period.

The Tennessee Department of Environment and Conservation agrees to:

1. Manage and maintain the mitigation area in perpetuity to the benefit of water quality and wildlife habitat in accordance with Tennessee Code Annotated §11-14-105, the Rules for Management of Tennessee Natural Resource Areas, and the May Prairie State Natural Area Management Plan (revised February 2012), a copy of which is attached as Exhibit A.

2. Reimburse the Tennessee Stream Mitigation Program for all costs associated with repair work, additional monitoring

requirements or reduction in mitigation credits, if the damages, increased monitoring requirements or reduction in mitigation credits is caused by, or is related to, TDEC's management practices within or adjacent to the mitigation area.

This Memorandum of Understanding shall remain in effect in perpetuity from the date of signature, and its terms are intended to be binding on the parties. Provisions of this MOU may only be modified by mutual consent.

Tennessee Stream Mitigation Program

By: _____ 12/11/12
Joey Woodard, Director Date

Tennessee Department of Environment and Conservation

By: _____ 6-28-12
Robert J. Martineau, Jr., Commissioner Date

Appendix D
Jurisdictional Determination Form

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 30 January 2013

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Nashville District (LRN), [redacted]

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State:TN County/parish/borough: Coffee City:
Center coordinates of site (lat/long in degree decimal format): Lat. 35.44665° N, Long. -86.02039° W.
Universal Transverse Mercator:
Name of nearest waterbody: Hunt Creek
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Duck River
Name of watershed or Hydrologic Unit Code (HUC): 06040002

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: 1/30/2013
☒ Field Determination. Date(s): 10/23/2012 and 12/7/2012

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☐ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☒ [redacted]
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: 4,205linear feet: 4 width (ft) and/or acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
      Elevation of established OHWM (if known):1080.

2. **Non-regulated waters/wetlands (check if applicable):**[3]

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: .

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: 437**acres**
   Drainage area: 437 **acres**
   Average annual rainfall: 55 inches
   Average annual snowfall: inches

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **3** tributaries before entering TNW.

   Project waters are **10-15** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: This unnamed tributary flows into Hunt Creek, which flows into Little Duck River, which flows into Duck River.

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[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Tributary stream order, if known: First.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain: .
- ☒ Manipulated (man-altered). Explain: Natural stream altered by channelization.

Tributary properties with respect to top of bank (estimate):
Average width: 4 feet
Average depth: 1 feet
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):

☒ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☒ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain:		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: Some reaches are unstable with steep, eroding banks, others are relatively stable where the stream is over widened.
Presence of run/riffle/pool complexes. Explain: Some are weakly present, but mostly lacking due to historic disturbance.
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: Seasonal. Likey only dry duing the driest few months of the year.
Other information on duration and volume: Flowns for at least 60 consecutive days in a year with normal precipitation.

Surface flow is: **Discrete and confined.** Characteristics: Mostly in a single thread channel wih one reach that is a braided channel.

Subsurface flow: **No**. Explain findings: Area soils are characterise by a fragipan that typically serves as a confining layer.
- ☐ Dye (or other) test performed: .

Tributary has (check all that apply):
- ☒ Bed and banks
- ☒ OHWM[6] (check all indicators that apply):

☒ clear, natural line impressed on the bank	☒ the presence of litter and debris
☐ changes in the character of soil	☒ destruction of terrestrial vegetation
☒ shelving	☒ the presence of wrack line
☒ vegetation matted down, bent, or absent	☒ sediment sorting
☒ leaf litter disturbed or washed away	☒ scour
☒ sediment deposition	☒ multiple observed or predicted flow events
☒ water staining	☐ abrupt change in plant community
☐ other (list):	

- ☒ Discontinuous OHWM.[7] Explain:Some reaches are highly disturbed, resulting in pooly defined bed and bank. Other areas are in over sized channel resulting from historic channelization.

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:

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[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: Water is generally clear and free of contaminants other than occasional turbidity resulting from stormwater runoff and erosion within the channel.
Identify specific pollutants, if known: .

(iv) Biological Characteristics. Channel supports (check all that apply):

☒ Riparian corridor. Characteristics (type, average width): Stream is within a State Natural Area. Some of riparian zone is wet mixed oak/hardwood several hundred feet wide Other riparian areas are part of a wer prairie systed approximately 50 acres in size.

☒ Wetland fringe. Characteristics: Some of the adjacent areas are wet prairie and others are wet flatwoods.

☒ Habitat for:

☐ Federally Listed species. Explain findings: .

☐ Fish/spawn areas. Explain findings: .

☒ Other environmentally-sensitive species. Explain findings: Numerous state-listed rare plants which are part of a natural community type very rare to the region.

☒ Aquatic/wildlife diversity. Explain findings: Unusually diverse floristically.

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size:50 acres

Wetland type. Explain:Palustrine, forested and wet prairie.

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Intermittent flow**. Explain: .

Surface flow is**: Discrete and confined**

Characteristics: .

Subsurface flow: **No**. Explain findings: Soils are characterized by a fragipan which serves as a confining layer.

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

☒ Directly abutting

☐ Not directly abutting

☐ Discrete wetland hydrologic connection. Explain: .

☐ Ecological connection. Explain: .

☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **10-15** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Wetland to navigable waters.**

Estimate approximate location of wetland as within the **2 - 5-year** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: This is a headwater wetland system driven primarily by precipitation in a relatively undeveloped watershed. Water quality is good.

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☒ Riparian buffer. Characteristics (type, average width):Several hundred feet wide in most areas. Some is forested and some is open.

☒ Vegetation type/percent cover. Explain:Apporximately half of the wetlands in the project area are open, wet prairie and the remainder is mixed oak/hardwood forest.

☐ Habitat for:

☐ Federally Listed species. Explain findings: .

☐ Fish/spawn areas. Explain findings: .

☒ Other environmentally-sensitive species. Explain findings:Several species of plants rare to the region and a unique natural community type (wet prairie).

☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **1**

Approximately (30) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Y	50		

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☒ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: Direct observation of flow in the channel at various times of year and under a variety of antcedent precipitation circumstances indicate at least seasonally persistent flow. Stream is indicated on a 1:24000 USGS topographic map with a continuous blueline.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **4,205** linear feet **4** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☒ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

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[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☒ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☒ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:1:24000 Manchester, TN.
☐ USDA Natural Resources Conservation Service Soil Survey. Citation: .
☐ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☐ Photographs: ☐ Aerial (Name & Date): .
or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☒ Other information (please specify): See TSMP Mitigation Project Proposal previously submitted.

B. ADDITIONAL COMMENTS TO SUPPORT JD:
A map from the mitigation proposal is attached for reference.

It is noted that the criteria for determining a "stream of the state" differ from those used to determine "waters of the U.S." For the purposes of determining the upper segment as a "stream of the state", TDEC visited the upper (channelized) portion (Reach 1) susequent to the IRT inspection . Based upon secondary indicators utilized of flow persistence, the upper portion (Reach 1) scored too low to classify as a "stream of the state". TSMP subsequently observed Reach 1 on November 20, 2012. following a November 12-13 (1.25") precipitation event with no additional rain over the next seven days. TSMP documented flow in the upstream channel from above the upper limit of the proposed project to the lower end. As such TSMP has documented a primary indicator for the upper reach. The significance is that a part of TDEC's hydrologic determination procedure utilizes "primary indicators" if a primary indicator is documented, then a stream determination can be made without getting into the more difficult process of scoring with secondary indicators. Flow in a channel seven days or more since the last precipitation event means that the reach in question is a "stream of the state" rather than a wet weather conveyance .

Appendix E
Hydrologic Determination Data

TENNESSEE STREAM TSMP MITIGATION PROGRAM

State Hydrologic Determination

During the IRT field review, a question was raised concerning whether the upper portion of the May Prairie Stream would classify as a stream rather than a wet weather conveyance in accordance with TDEC's Hydrologic Determination criteria. On November 2, 2012, TDEC personnel visited the site and completed an evaluation of MPS. The result of that evaluation was that the upper reach was not determined to be a stream. Additional subsequent observation of the watercourse documented the existence of sustained flow for long enough duration to classify the entire reach of the May Prairie Stream Restoration Project as a stream under the state's criteria. Additional documentation of those observations is attached in Appendix D.

Tennessee Division of Water Pollution Control, Version 1.4

County: Coffee	Named Waterbody: Hunt Creek	Date/Time: 11/2/12 1030
Assessors/Affiliation: JCA DWR- COL EFO		Project ID :
Site Name/Description: May Prairie TSMP project site		
Site Location: May Prairie u/s Hillsboro Hwy		
USGS quad: 86 NE	HUC (12 digit): TN06400025020	Lat/Long: d/s 35.44746 / -86.02304
Previous Rainfall (7-days) : None		
Precipitation this Season vs. Normal : very wet (wet) average dry drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos: (Y) or N (circle) Number :	
Soil Type(s) / Geology :	Source:	
Surrounding Land Use : Forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : (Severe) Moderate Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge		WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass		WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions		WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall		WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase		Stream
6. Presence of fish (except *Gambusia*)		Stream
7. Presence of naturally occurring ground water table connection		Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed		Stream
9. Evidence watercourse has been used as a supply of drinking water		Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = * Stream

Secondary Indicator Score (if applicable) = 20.5

Justification / Notes :

* Scores as a stream but is functioning prob. more as a channel thru a wetland.

Section of channel d/s of 35.44746 / -86.02304

A. Geomorphology (Subtotal = 7)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	(3)
2. Sinuous channel	0	(0.5) 1	2	3
3. In-channel structure: riffle-pool sequences	0	(1)	2	3
4. Sorting of soil textures or other substrate	0	(1)	2	3
5. Active/relic floodplain	(0)	1	2	3
6. Depositional bars or benches	0	(0.5) 1	2	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	0	(0.5)	1	1.5
9. Natural levees	(0)	1	2	3
10. Headcuts	(0)	1	2	3
11. Grade controls	(0)	0.5	1	1.5
12. Natural valley or drainageway	0	(0.5)	1	1.5
13. At least second order channel on existing USGS or NRCS map	(No = 0)		Yes = 3	

B. Hydrology (Subtotal = 4.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0	(1)	2	3
15. Water in channel and >48 hours since sig. rain	0	(1)	2	3
16. Leaf litter in channel (January – September) (NA)	1.5	1	0.5	0
17. Sediment on plants or on debris	0	(0.5)	1	1.5
18. Organic debris lines or piles (wrack lines)	0	(0.5)	1	1.5
19. Hydric soils in stream bed or sides of channel	No = 0		(Yes = 1.5)	

C. Biology (Subtotal = 9)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	(3)	2	1	0
21. Rooted plants in channel [1]	3	(2)	1	0
22. Crayfish in stream (exclude in floodplain)	(0)	0.5	1	1.5
23. Bivalves/mussels	(0)	1	2	3
24. Amphibians	(0)	0.5	1	1.5
25. Macrobenthos (record type & abundance) *	0	(1)	2	3
26. Filamentous algae; periphyton	0	(1)	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	(1)	1.5
28. Wetland plants in channel [2]	0	0.5	(1)	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 20.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes : * Isopods, Amphipods in channel

Tennessee Division of Water Pollution Control, Version 1.4

County: Coffee	Named Waterbody: Hunt Creek	Date/Time: 11/2/12 1030
Assessors/Affiliation: JCA DWR - Col EFO		Project ID :
Site Name/Description: May Prairie TSMP project site		
Site Location: May Prairie u/s Hillsboro Hwy		
USGS quad: 86NE	HUC (12 digit): TN06040002502_0100	Lat/Long: u/s of 35.44746 / -86.02304
Previous Rainfall (7-days) : None		
Precipitation this Season vs. Normal : very wet (wet) average dry drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos: (Y) or N (circle) Number :	
Soil Type(s) / Geology :	Source:	
Surrounding Land Use : Forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : (Severe) Moderate Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge		WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass		WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions		WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall		WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase		Stream
6. Presence of fish (except *Gambusia*)		Stream
7. Presence of naturally occurring ground water table connection		Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed		Stream
9. Evidence watercourse has been used as a supply of drinking water		Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Wet Weather Conveyance

Secondary Indicator Score (if applicable) = 11

Justification / Notes :

Section of Channel u/s of 35.44746/-86.02304

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	

B. Hydrology (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	2	3
16. Leaf litter in channel (January – September) (NA)	1.5	1	0.5	0
17. Sediment on plants or on debris	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel	No = 0		Yes = 1.5	

C. Biology (Subtotal = 4)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	2	1	0
21. Rooted plants in channel [1]	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel [2]	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 11

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Dan Eagar <dan.eagar@tsmp.us> November 27, 2012 12:38 PM

To: "benjamin.brown@tn.gov" <benjamin.brown@tn.gov>, Tyree Marty <marty.g.tyree@usace.army.mil>

Cc: Bowers Todd <bowers.todd@epa.gov>, Todd Rob <rob.todd@tn.gov>, Sykes Robbie <robbie_sykes@fws.gov>, Crockett Chris <chris.crockett@tsmp.us>, Chance Eric <eric.chance@tsmp.us>, Woodard Joey <joey.woodard@tsmp.us>, Zeman Mike <mike.zeman@tn.usda.gov>, "chad.augustin@tn.gov" <chad.augustin@tn.gov>, Saylor Charlie <cfsaylor@tva.gov>

May Prairie Stream Determination

If you already received this yesterday, I apologize. I'm having some e-mail problems.

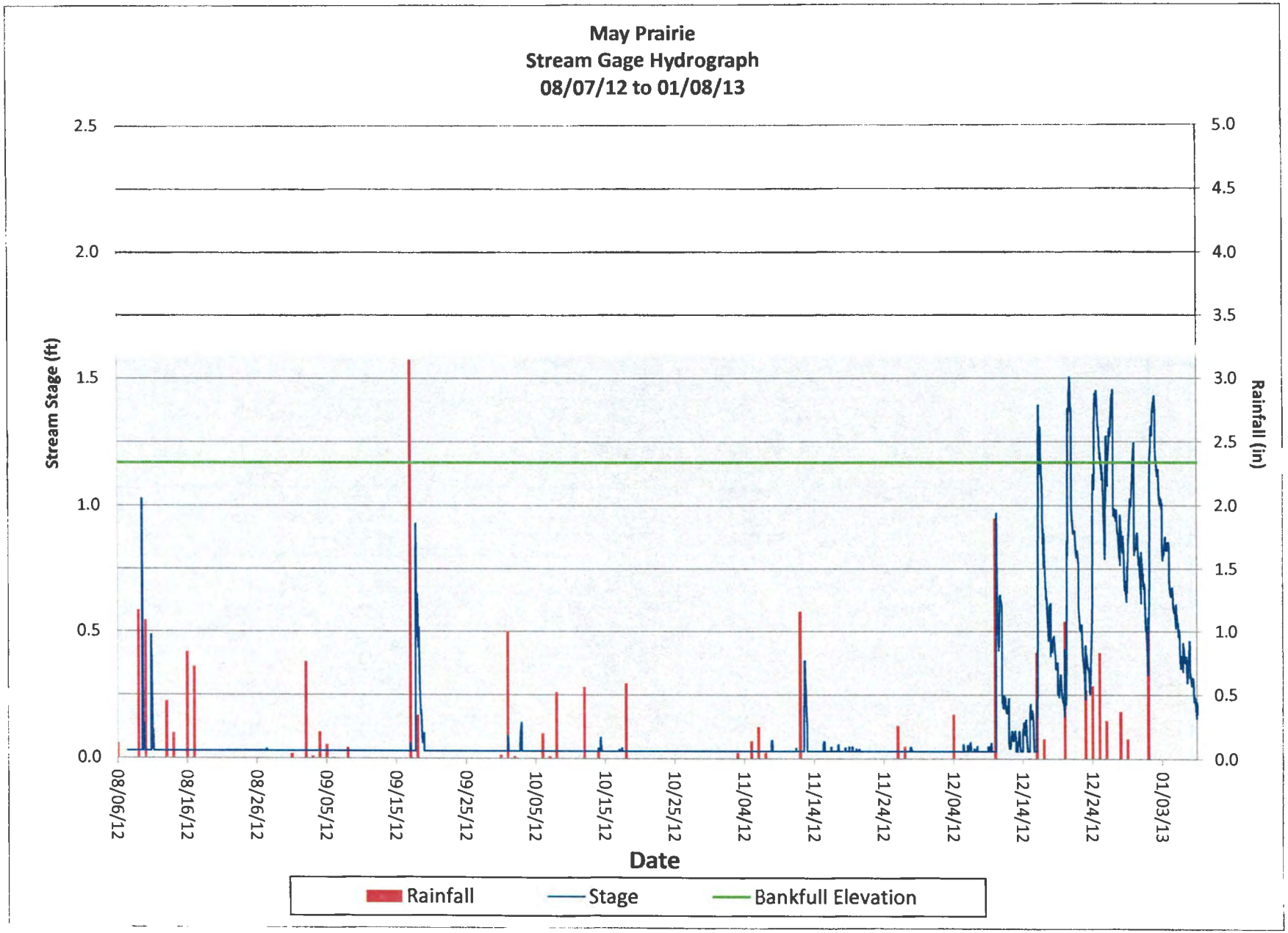
This is following up on discussion in the field and since our October 23rd site visit to May Prairie. Ben raised the question of whether the upper (channelized) portion of the watercourse would delineate as a stream per TDEC's criteria. Ben followed our visit with a field inspection accompanied by Chad Augustin from TDEC's Columbia Field Office. They determined that the lower portion of the channel (from where it enters the edge of the open field) is a stream, but that based on secondary indicators of flow persistence, the upper portion scored too low to classify as a stream. If that reach were not a stream, it would not be in play as a mitigation project - at least for TDEC.

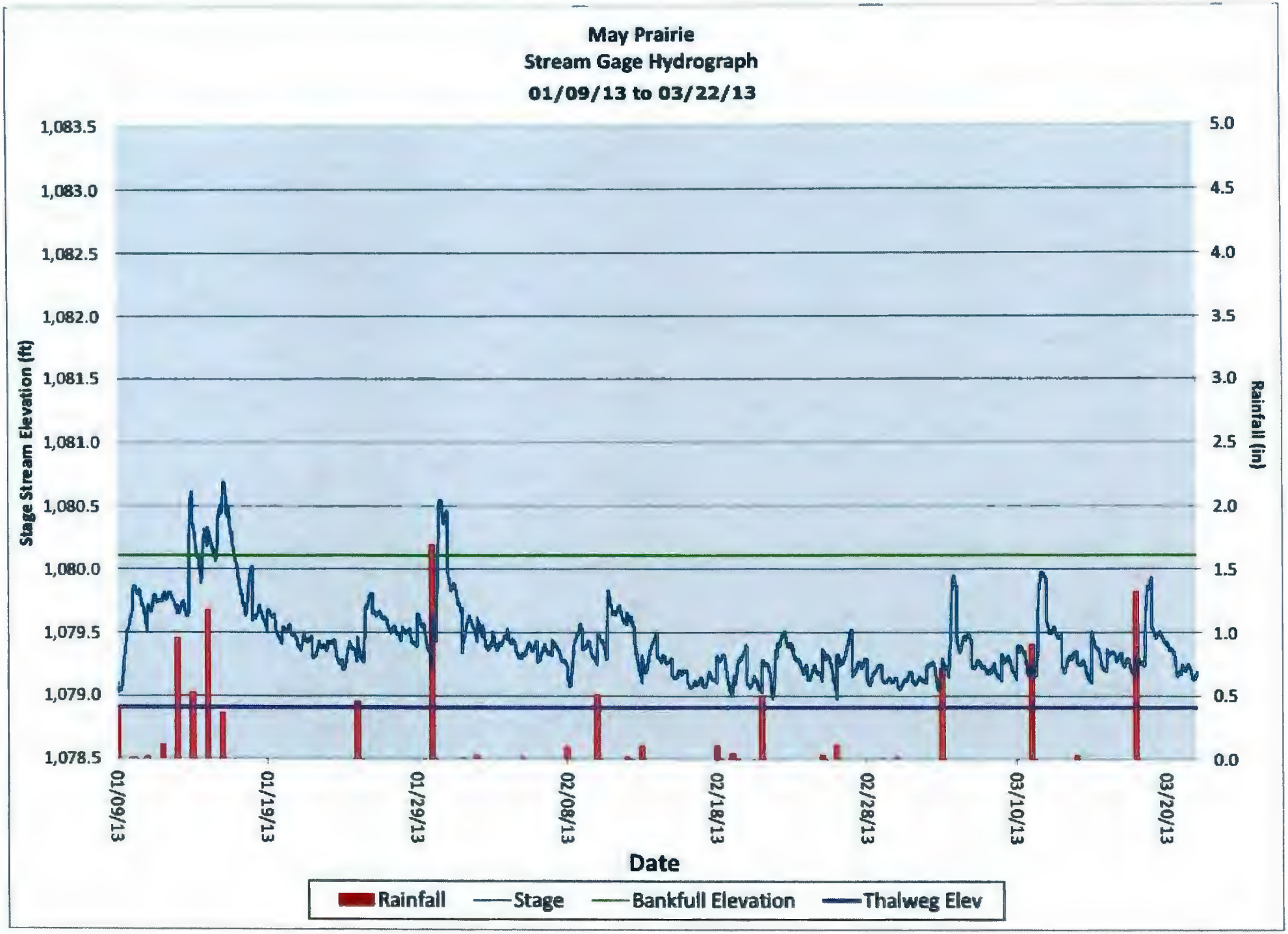
We have had the opportunity to look at the segment in question over time. We watched precipitation records and found there had been a pretty good rainfall in the Coffee County area on November 12-13 (1.25") with no additional rain over the next seven days. On November 20th Eric Chance, who lives in Coffee County, went by the site and documented flow in the upstream channel from above the upper limit of the proposed project all the way down to the lower end. The significance of this is that a part of TDEC's hydrologic determination procedure utilizes "primary indicators" if a primary indicator is documented, then a stream determination can be made without getting into the more difficult process of scoring with secondary indicators. Flow in a channel seven days or more since the last precipitation event means that the reach in question is a stream rather than a wet weather conveyance. Most of this I say not for Ben and Chad, but for the rest of you who may not be familiar with the dark science of hydrologic determination.

I think this was the only unresolved issue with this project. Without objection, we will proceed with project planning.

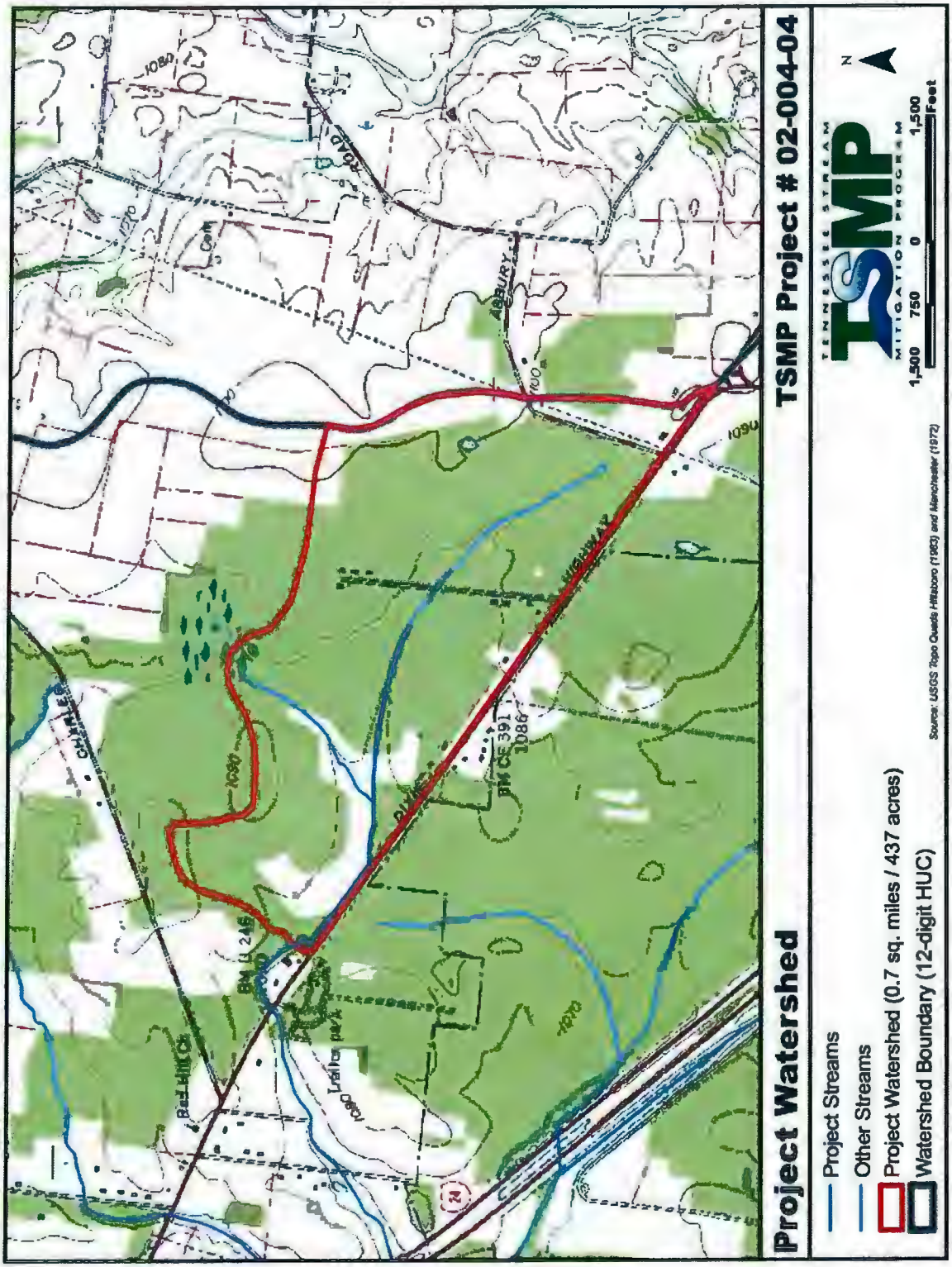
Dan Eagar, Program Manager

Tennessee Stream Mitigation Program
5000 Linbar Drive, Suite 275
Nashville, TN 37211
615.831.9311 x-113 office
615.831.9081 fax
www.tsmp.us


May Prairie
Stream Gage Hydrograph
08/07/12 to 01/08/13
Stream Stage (ft)
Rainfall (in)
2.5
2.0
1.5
1.0
0.5
0.0
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
08/06/12
08/16/12
08/26/12
09/05/12
09/15/12
09/25/12
10/05/12
10/15/12
10/25/12
11/04/12
11/14/12
11/24/12
12/04/12
12/14/12
12/24/12
01/03/13
Date
Rainfall
Stage
Bankfull Elevation


May Prairie
Stream Gage Hydrograph
01/09/13 to 03/22/13
Stage Stream Elevation (ft)
1,083.5
1,083.0
1,082.5
1,082.0
1,081.5
1,081.0
1,080.5
1,080.0
1,079.5
1,079.0
1,078.5
Rainfall (in)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
01/09/13
01/19/13
01/29/13
02/08/13
02/18/13
02/28/13
03/10/13
03/20/13
Date
Rainfall
Stage
Bankfull Elevation
Thalweg Elev

Appendix F
Site Maps


Project Watershed
TSMP Project # 02-004-04
Project Streams
Other Streams
Project Watershed (0.7 sq. miles / 437 acres)
Watershed Boundary (12-digit HUC)
TENNESSEE STREAM MITIGATION PROGRAM
1,500 750 0 1,500 Feet
N
Source: USGS Topo Quads Hillsboro (1963) and Manchester (1972)


Reach 4 - 1,375 LF
Reach 3 - 950 LF
Reach 2 - 1,175 LF
Reach 1 - 725 LF
TSMP Project # 02-004-04
Existing Conditions
Project Reach 1
Project Reach 2
Project Reach 3
Project Reach 4
Other Streams
May Prairie State Natural Area
TENNESSEE STREAM TSMP MITIGATION PROGRAM
N
600 300 0 600 Feet


End Project
Reach 4 - 1,206 LF
Begin Replacement
Reach 3 - 994 LF
Continue Restoration
Reach 2 - 1,510 LF
Continue Restoration
Reach 1 - 971 LF
Begin Restoration
Proposed Conditions
TSMP Project # 02-004-04
Project Reach 1
Project Reach 2
Project Reach 3
Project Reach 4
Other Streams
May Prairie State Natural Area
Project Parcels
TENNESSEE STREAM
TSMP
MITIGATION PROGRAM
N
600 300 0 600
Feet

Appendix G
Site Photographs

Reach 1

Reach 2

Reach 3

Reach 3

Reach 4

Appendix H
Tennessee Historical Commission
Review Letter

TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

September 26, 2011

Mr. Chris Crockett
TSMP
5000 Linbar Drive, Suite 265
Nashville, Tennessee 37211

RE: TAR, MAY PRAIRIE STREAM RESTORATION, MANCHESTER, COFFEE COUNTY

Dear Mr. Crockett:

The Tennessee State Historic Preservation Office has reviewed the above-referenced undertaking received on Thursday, September 22, 2011 for compliance by the participating federal agency or applicant for federal assistance with Section 106 of the National Historic Preservation Act. The Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

After considering the documentation submitted, it is our opinion that there are no National Register of Historic Places listed or eligible properties affected by this undertaking. This determination is made either because of the location, scope and/or nature of the undertaking, and/or because of the size of the area of potential effect; or because no listed or eligible properties exist in the area of potential effect; or because the undertaking will not alter any characteristics of an identified eligible or listed property that qualify the property for listing in the National Register or alter such property's location, setting or use. Therefore, this office has no objections to your proceeding with the project.

If your agency proposes any modifications in current project plans or discovers any archaeological remains during the ground disturbance or construction phase, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. If you are applying for federal funds, license or permit, you should submit this letter as evidence of consultation under Section 106 to the appropriate federal agency, which, in turn, should contact us as required by 36 CFR 800. If you represent a federal agency, you should submit a formal determination of eligibility and effect to us for comment. You may direct questions or comments to Jennifer M. Barnett (615) 741-1588, ext. 105. This office appreciates your cooperation.

Sincerely,

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb

Appendix I
TDEC Natural Heritage Program Review Letter

STATE OF TENNESSEE

DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Resource Management
Natural Heritage Program
7th Floor L&C Annex
401 Church Street
Nashville, Tennessee 37243
Phone 615/532-0431 Fax 615/532-0046

February 13, 2012

Chris Crockett
Tennessee Stream Mitigation Program
5000 Linbar Drive, Suite 265
Nashville, TN 37211

Subject: May Prairie State Natural Area Stream Restoration Project
Coffee County, Tennessee
Rare Species Database Review

Dear Mr. Crockett:

Thank you for your correspondence requesting an environmental review for the proposed May Prairie Stream Restoration Project in Coffee County, Tennessee. The project is planned for the May Prairie Designated State Natural Area, one of the richest sites for rare plant species in Tennessee.

The restoration project is a collaborative effort between the TDEC Natural Areas Program and the Tennessee Stream Mitigation Program. The Natural Heritage Program is part of the same division as Natural Areas, and our botanists and zoologist work closely with Natural Areas ecologists to ensure rare species conservation. We have previously consulted with the Natural Areas Program regarding this project, and we believe that the current project plans adequately address rare species concerns. We ask that you continue to carefully coordinate this project with Natural Areas Program staff, especially when land and channel disturbance begins. We anticipate that this project will greatly improve and expand rare species habitat on the Natural Area by returning stream flow to pre-development conditions.

Thank you for considering Tennessee's rare species throughout the planning of this project. Should you have any questions, please do not hesitate to contact me at (615) 532-0440 or silas.mathes@tn.gov .

Sincerely,

Silas Mathes
Heritage Data Manager

Cc: Brian Bowen, State Natural Areas Program

Appendix J
USFWS Review Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

November 2, 2011

Mr. Chris Crockett
Project Manager
Tennessee Stream Mitigation Program
5000 Linbar Drive, Suite 265
Nashville, Tennessee 37211

Subject: FWS #2012-CPA-0010. Tennessee Stream Mitigation Program. May Prairie Stream Restoration Project, Coffee County, Tennessee.

Dear Mr. Crockett:

Fish and Wildlife Service (Service) personnel have reviewed the information which you provided relevant to the subject proposal. The project would involve the restoration and enhancement of approximately 5,190 linear feet of two unnamed tributaries to Hunt Creek in Coffee County, Tennessee. Information in your correspondence indicates that the existing channels have been degraded due to poor agricultural practices and channelization. The stream alterations have caused eroded areas, channel instability, and unstable sediment deposition. In addition to restoring the stream channels, a 100-foot riparian buffer would be protected by a perpetual conservation easement.

Our database and the information provided indicates that suitable roosting habitat for the federally endangered Indiana bat (*Myotis sodalis*) may exist within the project area and could be altered by the proposed action. Habitat that is suitable for use by the species during summer includes trees, snags, and similar structures. Although the species has used trees smaller than five inches diameter at breast height, structure that is five inches and larger is considered adequate size. The structure must have exfoliating bark, crevices, or other characteristics that would be considered by a person with sufficient experience (as recognized by the Fish and Wildlife Service) to provide adequate shelter for one or more bats. Caves, abandoned mines, and similar structures are not considered in this definition.

We recommend that disturbance of the suitable roosting habitat be avoided and minimized to the greatest extent possible. A qualified biologist should assess potential impacts and determine if the proposed project may affect Indiana bats. If this project involves Federal funding or a Federal permit, the lead Federal agency should submit a copy of your assessment and findings to this office for review and concurrence. A finding of "may affect" could require initiation of formal consultation by the lead Federal agency.

Thank you for the opportunity to comment on this proposed action. If you have any questions regarding the information which we have provided, please contact Robbie Sykes of my staff at 931/525-4979.

Sincerely,

Peggy W. Shute

for Mary E. Jennings
Field Supervisor

David Pelren <david_pelren@fws.gov> July 12, 2013 2:38 PM
To: Chris Crockett <chris.crockett@tsmp.us>
Cc: Robbie Sykes <robbie_sykes@fws.gov>, Rob Todd <rob.todd@tn.gov>
RE: May Prairie M. Sedalis Phase I HA

Chris –

I have reviewed the bat habitat assessment report that you provided with your e-mail on July 1, 2013, regarding the subject stream restoration project. You also clarified some questions for me in an e-mail today (July 12, 2013). I understand that all removal of suitable Indiana bat roost trees is expected to occur between October 15 and March 31. You indicated that in cases where suitable roost trees would need to be removed outside of that time frame, other means of addressing potential impacts to bats would be pursued. For example, evening emergence observations of trees with their removal within 24 hours could be accomplished if bats are not observed to use the trees. Please note that evening observation of potential roost trees with 24-hour removal should be conducted between May 15 and August 15. This would assist us in providing evidence of a lack of indirect or cumulative impacts to the Indiana bat. Any measures used to avoid impacts to Indiana bats (other than tree removal during winter) should be coordinated with the Fish and Wildlife Service prior to their implementation.

Based on use of the measures described above, I believe that tree clearing would not likely result in adverse effects to the Indiana bat. The Fish and Wildlife Service concludes that the requirements of the Endangered Species Act (Act) of 1973, as amended, are fulfilled for the Indiana bat and other listed species relative to this aspect of the May Prairie Stream Restoration project. You should coordinate further with our office if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

We in the Tennessee Ecological Services Field Office appreciate your efforts to appropriately address the needs of endangered and threatened species in this situation. Feel free to contact me with any questions.

David Pelren
Fish and Wildlife Biologist
Ecological Services
U.S. Fish and Wildlife Service
446 Neal St.
Cookeville, TN 38501
office phone: 931-525-4974
cell phone: 931-261-5844

From: Chris Crockett [mailto:chris.crockett@tsmp.us]
Sent: Friday, July 12, 2013 10:41 AM
To: David Pelren
Subject: Re: May Prairie M. Sedalis Phase I HA

Dave,

There have not been any dead or snag trees that have been identified within project's limits of disturbance. We are also avoiding the removal of any mature trees (especially those that retain the characteristics Indiana Bats prefer, such as exfoliating bark). Also, I believe we will be getting close to hitting the end of the moratorium dates. We have 60 to 90 days built into our schedules for permitting which would put us at beginning construction between September 15 and October 15 if we were to turn this permit in Monday. If construction does happen to begin before the moratorium ends we will take precautions that have been suggested and implement them, such as evening observation within 24 of tree removal (that is if a tree or trees must be removed).

Thanks,

CC

On Jul 12, 2013, at 10:25 AM, David Pelren <david_pelren@fws.gov> wrote:

Chris –

Thank you for the habitat assessment report for the May Prairie project. I'm going to need to get more information from you. I believe that indirect and cumulative effects will probably be at an appropriate level, but direct effects upon individual Indiana bats have not been adequately addressed.

I see that some suitable Indiana bat roosting habitat would likely be disturbed during this project. If you were to remove this habitat at this site between October 15 and March 31, we could probably concur with a determination that the project is not likely to adversely affect the species. If this is not possible, I would need for you to address the concern otherwise (for example evening observation of each suitable roosting structure with tree removal within 24 hours if bats aren't observed to emerge). What can you tell me about your plans for addressing direct take of individual bats?

Give me a holler if you'd like to, or send your phone number. I'll be in the office until 1:00 today and possibly as late as 2:30. I'll be back in on Monday.

David Pelren
Fish and Wildlife Biologist
Ecological Services
U.S. Fish and Wildlife Service
446 Neal St.
Cookeville, TN 38501
office phone: 931-525-4974
cell phone: 931-261-5844

From: Chris Crockett [mailto:chris.crockett@tsmp.us]
Sent: Monday, July 01, 2013 10:32 AM
To: david_pelren@fws.gov
Subject: May Prairie M. Sedalis Phase I HA

Dave,

I hope this email finds you well. Attached is the M. Sedalis Phase I Habitat Assessment. If you would please send me an email back indicating your approval. It would be greatly appreciated. Have a great 4th.

Thanks,

Chris Crockett
Project Manager
Tennessee Stream Mitigation Program
5000 Linbar Drive, Suite 275
Nashville, TN 37211
615 691 2021
chris.crockett@tsmp.us

Appendix K
Preliminary Design Plans

TSMP PROJECT#: 02-004-04

TENNESSEE STREAM MITIGATION PROGRAM

STATE	TSMP PROJECT#	SHEET NO.	TOTAL SHEETS
TN	02-004-04	1	19

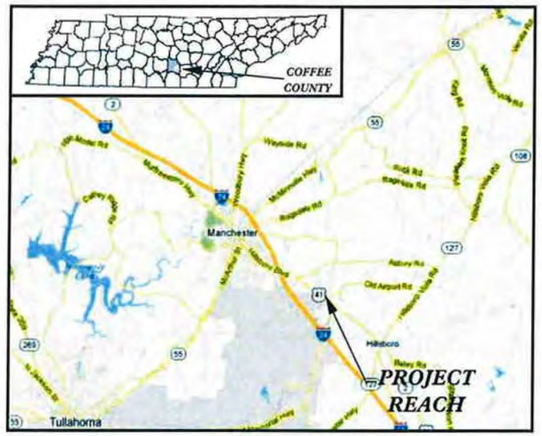
A	PRELIMINARY PLANS	06/2013	
NO.	DESCRIPTION	DATE	APPROVED

REVISIONS

MAY PRAIRIE STREAM RESTORATION

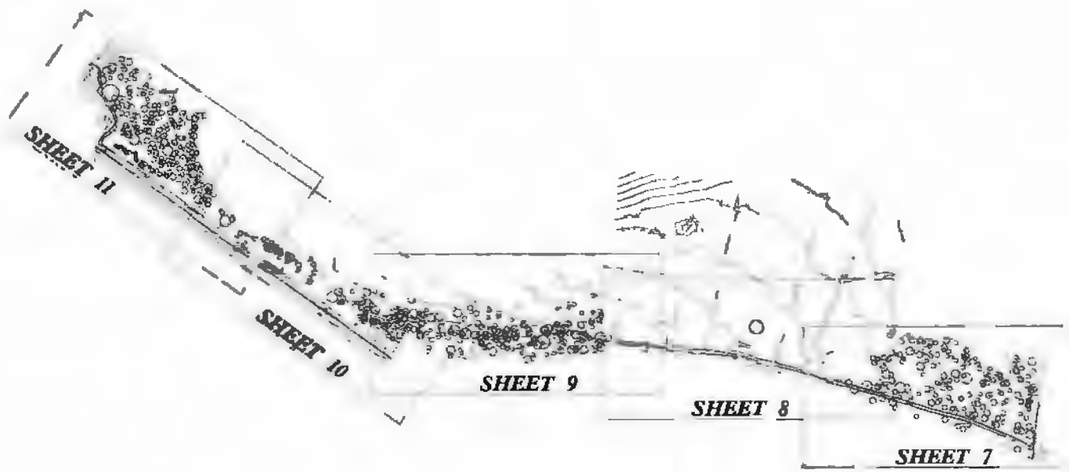
LOCATION: *A CONTINUOUS REACH OF AN UNNAMED TRIBUTARY IN THE MAY PRAIRIE STATE NATURAL AREA MANCHESTER, TENNESSEE*

TYPE OF WORK: *STREAM RESTORATION*



VICINITY MAP
NOT TO SCALE

ISSUING AGENCY	PERMIT #
USACE NWP27:	IN PROCESS
TDEC ARAP:	IN PROCESS
TDEC NPDES:	IN PROCESS



INDEX OF SHEETS

PRELIMINARY PLANS

GRAPHIC SCALES

PLANS: –40 –20 0 40 80

PROFILE (HORIZONTAL): –40 –20 0 40 80

PROFILE (VERTICAL): –4 –2 0 4 8

PROJECT LENGTH

EXISTING CHANNEL

REACH 1	= 725 FEET
REACH 2	= 1,175 FEET
REACH 3	= 950 FEET
REACH 4	= 1,375 FEET
TOTAL LENGTH	= 4,225 FEET

PROPOSED CHANNEL

REACH 1	= 971 FEET
REACH 2	= 1,510 FEET
REACH 3	= 994 FEET
REACH 4	= 1,206 FEET
TOTAL LENGTH	= 4,681 FEET

Prepared in the Office of:

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

PROJECTED START DATE
SEPTEMBER 2013

PROJECTED COMP. DATE
DECEMBER 2013

GARY M. MRYNCZA, P.E.
PROJECT ENGINEER

GARY MICHAEL MRYNCZA — REGISTERED ENGINEER — AGRICULTURE — No. 111554 — STATE OF TENNESSEE

Prepared for:

TENNESSEE STREAM TSMP MITIGATION PROGRAM

CHRIS CROCKETT
PROJECT MANAGER
(615) 691-2021

GENERAL NOTES:

ALL BEARINGS ARE BASED ON NAD '83 GRID BEARINGS. ALL DISTANCES AND COORDINATES SHOWN ARE HORIZONTAL (GROUND) VALUES.

ALL GRADED AREAS SHALL BE STABILIZED WITHIN 48 HOURS.

EVERY EFFORT SHALL BE TAKEN TO MINIMIZE DISTURBANCE IN THE STREAM CHANNEL AND IN GAINING ACCESS TO/FROM THE WORK AREA.

IMPLEMENTED SEDIMENTATION AND EROSION CONTROLS SHALL BE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL EROSION CONTROL REGULATIONS.

CONTRACTOR SHALL KEEP ALL SURROUNDING PUBLIC ROADWAYS AND DRAINAGE SYSTEMS FREE FROM DIRT, MUD, AND CONSTRUCTION DEBRIS AT ALL TIMES.

CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ANY ITEMS DAMAGED DURING CONSTRUCTION, INCLUDING FENCING, ROADS, ETC.

ALL EARTH MOVING EQUIPMENT SHALL BE SERVICED PRIOR TO WORK COMMENCING EACH MORNING. EQUIPMENT SHALL BE MAINTAINED TO PREVENT FUEL, OIL AND LUBRICANT SPILLS INTO THE WATERWAY AND/OR RIPARIAN AREA.

SUBSURFACE:
EXCEPT FOR THAT SPECIFIED IN THESE NOTES AND ON THE PLANS, NO SUBSURFACE DATA IS MADE AVAILABLE TO THE CONTRACTOR FOR THIS PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING HIS OWN SUBSURFACE INVESTIGATIONS AS THEY RELATE TO THIS PROJECT.

MATERIALS:
EXCAVATED MATERIAL SHALL TEMPORARILY BE STOCKPILED IN NON-FORESTED AND NON-WETLAND AREAS WITHIN THE LIMIT OF DISTURBANCE. EXACT LOCATION OF THE TEMPORARY SPOIL AREAS SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING APPROPRIATE STABILIZATION MEASURES OUTSIDE OF THE SPOIL AREAS TO PREVENT EROSION AND SEDIMENTATION.

THE CONTRACTOR SHALL STOCKPILE USABLE ONSITE MATERIALS, INCLUDING BRANCHES AND BRUSH, FOR USE IN BANK STABILIZATION, GRADE CONTROL, AND IN-STREAM STRUCTURES.

UTILITIES:
THE CONTRACTOR SHALL FIELD VERIFY ALL UTILITIES INSIDE THE LIMIT OF DISTURBANCE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE INCURRED TO ANY UTILITY SERVICE LINE AT NO COST OR OBLIGATION TO THE OWNER.

CONTRACTOR SHOULD CALL THE "CALL BEFORE YOU DIG" NUMBER FOR UTILITY LOCATIONS (800-351-1111 OR 811) PRIOR TO COMMENCEMENT OF EARTHWORK.

MAY PRAIRIE CONTROL POINTS

PT	NORTHING	EASTING	ELEV
KCI#1	406328.42	1958780.96	1072.56
KCI#2	405975.29	1959275.66	1072.89
KCI#3	406043.65	1959659.42	1074.14
KCI#4	405748.75	1959593.83	1073.54
KCI#5	405701.95	1960028.94	1074.27
KCI#6	405790.96	1960367.62	1075.63
KCI#7	406833.99	1959789.67	1069.00
KCI#8	406814.47	1958630.36	1070.29
KCI#9	405844.86	1960794.48	1077.45
KCI#10	405660.42	1961684.14	1080.04
KCI#11	405508.89	1962084.04	1081.16
KCI#12	405461.54	1962397.70	1082.55
KCI#13	405875.61	1962460.73	1083.61

PROJECT LEGEND

VEGETATION

EXISTING WOODS LINE

SINGLE TREE

TOPOGRAPHY

MINOR CONTOUR LINE

MAJOR CONTOUR LINE - 720 -

MISCELLANEOUS

EXISTING FENCING —X——X——X—

CONTROL POINT KCI#11

STREAM RESTORATION

PROPOSED THALWEG W/ APPROXIMATE BANKFULL LIMITS (12+00 — 13+00)

PROPOSED STONE/BOULDER TOE

PROPOSED CHANNEL BLOCK

PROPOSED CONSTRUCTED RIFFLE

PROPOSED TOE WOOD WITH SOIL LIFT

PROPOSED ROCK FORD CROSSING

PROPOSED CONSTRUCTED LOG RIFFLE

PROPOSED BERM/ISOLATED STREAM FILL

PROPOSED PLUNGE POOL

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

TENNESSEE STREAM MITIGATION PROGRAM TSMP

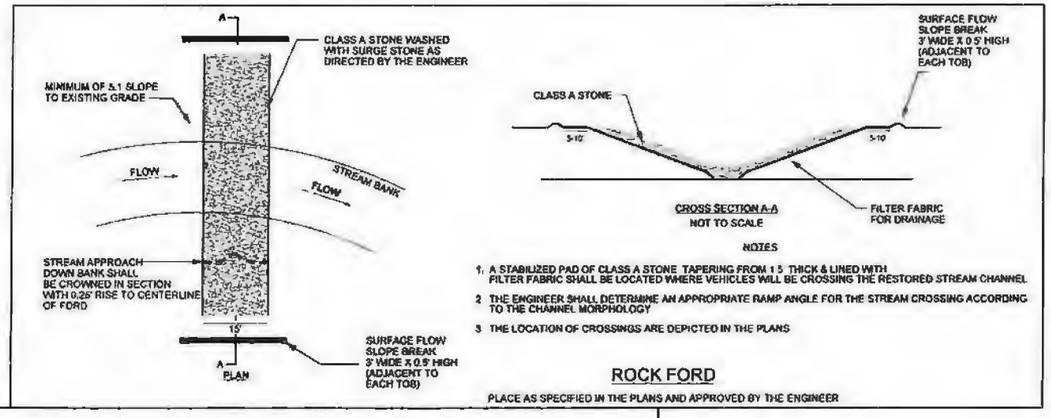
KCI TECHNOLOGIES
7003 CADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

DATE: JUNE 2013
SCALE: N.T.S.

GENERAL NOTES AND SITE DATA

SHEET 2 OF 19

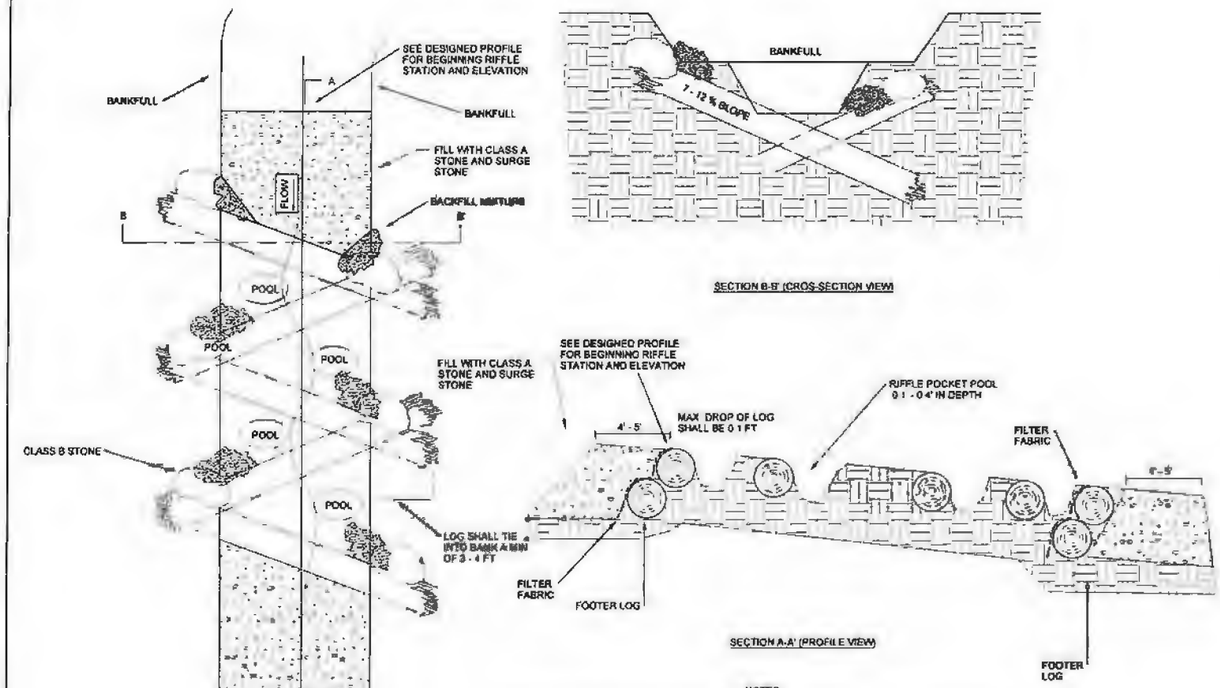


NOTES

1. A STABILIZED PAD OF CLASS A STONE TAPERING FROM 1.5' THICK & LINED WITH FILTER FABRIC SHALL BE LOCATED WHERE VEHICLES WILL BE CROSSING THE RESTORED STREAM CHANNEL
2. THE ENGINEER SHALL DETERMINE AN APPROPRIATE RAMP ANGLE FOR THE STREAM CROSSING ACCORDING TO THE CHANNEL MORPHOLOGY
3. THE LOCATION OF CROSSINGS ARE DEPICTED IN THE PLANS

ROCK FORD

PLACE AS SPECIFIED IN THE PLANS AND APPROVED BY THE ENGINEER



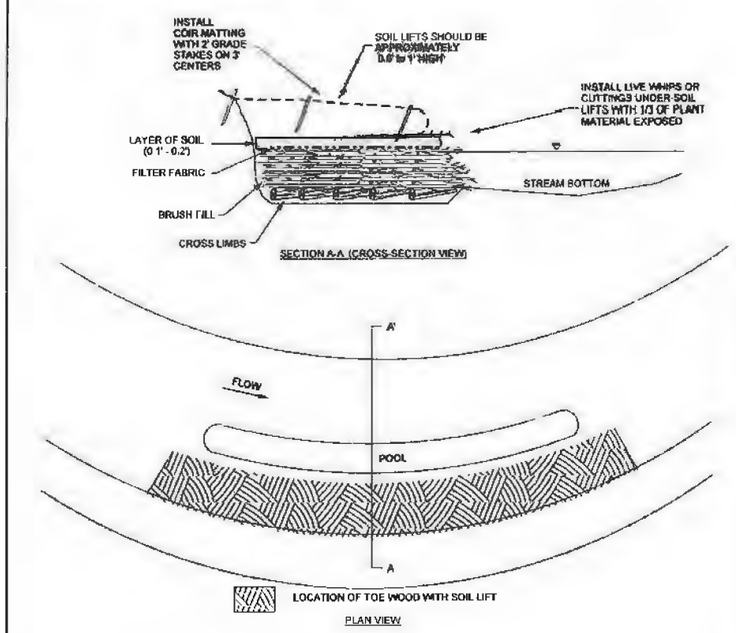
NOTES

- PLACE FABRIC ON THE UPSTREAM SIDE OF THE MOST UPSTREAM AND DOWNSTREAM LOG SILLS IN THE CONSTRUCTED RIFFLE
- NAIL FILTER FABRIC ON TOP OF SURFACE LOG USING GALVANIZED ROOFING NAILS ON 1 FOOT SPACING ALONG THE LOG
- CLASS B STONE SHALL BE USED TO ANCHOR LOGS UNLESS DIRECTED BY ENGINEER

  LOG SILLS SHALL OVERLAP AND ANCHOR THE LOG SILL DIRECTLY UPSTREAM
- THE LOG SILLS SHALL ALL BE DESIGNED TO BE SUMERGED OR COVERED AT LOW FLOWS
- A MIXTURE OF STONE AND NATIVE STREAM MATERIALS WILL BE USED IN THE RIFFLES AS BACKFILL TO CHINK GAPS IN THE ANCHOR BOULDERS
- ALL LOGS SHALL BE RELATIVELY STRAIGHT AND A MINIMUM OF 10 INCHES IN DIAMETER

CONSTRUCTED LOG RIFFLE

SCALE: NTS



NOTES

STEP 1 - INSTALL 4" TO 10" CROSS LIMBS ANGLED 30 DEGREES UPSTREAM

STEP 2 - FILL TOP OF CROSS LIMBS WITH BRUSH INSTALLED IN MULTIPLE DIRECTIONS

STEP 3 - PLACE FILTER FABRIC OVER THE BRUSH AND ADD A LAYER OF SOIL ON TOP SOIL LAYER IS APPROX 0.1' - 0.2' HIGH THEN INSTALL SOIL LIFT

TOE WOOD WITH SOIL LIFT

SCALE: NTS

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
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No. 111554
STATE OF TENNESSEE

STM	DESCRIPTION	DATE	APPROVED
	REVISIONS		

TENNESSEE STREAM MITIGATION PROGRAM TSMP

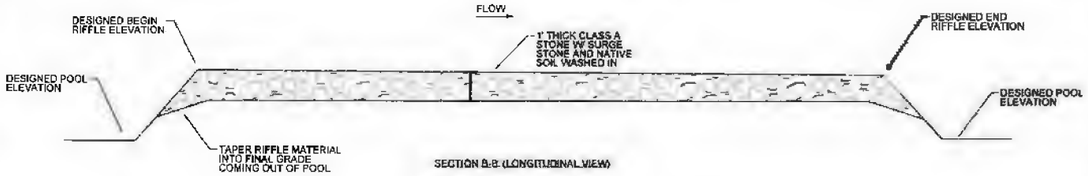
KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

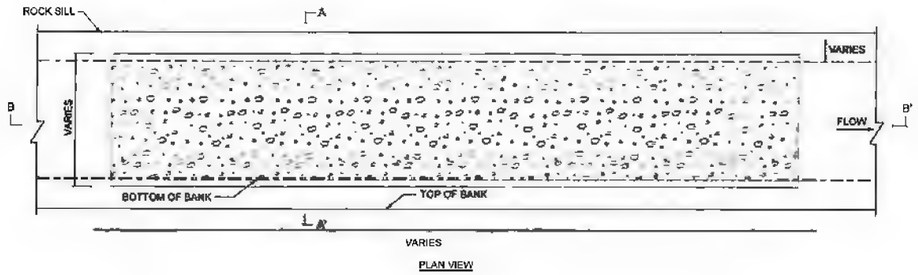
MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

DATE: JUNE 2013
SCALE: NTS

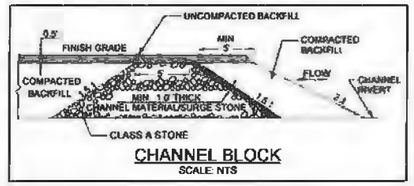
DETAILS:
STREAM RESTORATION

SHEET 3 OF 19

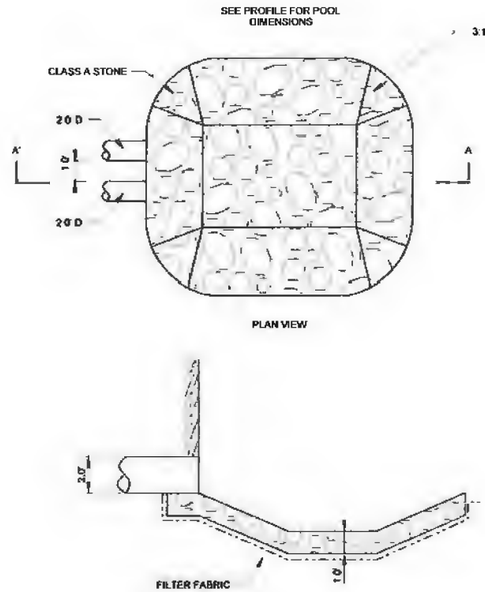




CONSTRUCTED RIFFLE
SCALE: NTS



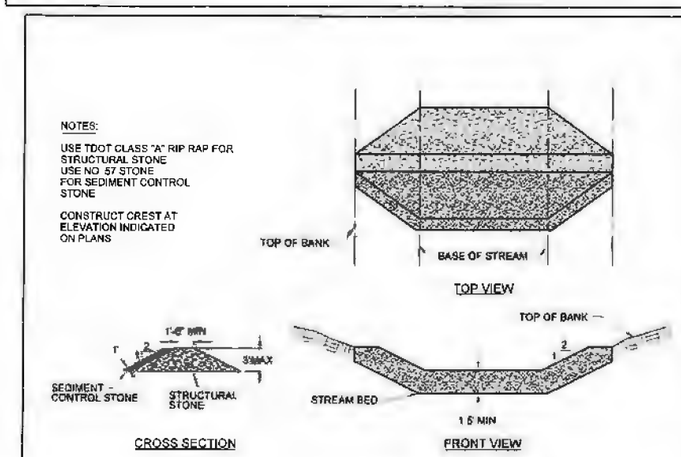
CHANNEL BLOCK
SCALE: NTS



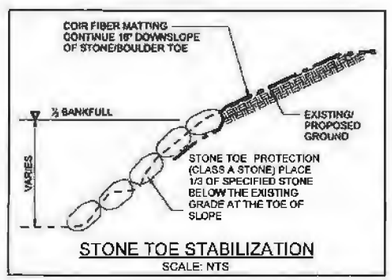
NOTES

- USE CLASS A STONE
- EMBED THE FILTER FABRIC A MINIMUM OF 4 INCHES AND EXTEND THE FILTER FABRIC A MINIMUM OF 6 INCHES BEYOND THE EDGE OF THE SCOUR HOLE

PLUNGE POOL
SCALE: NTS



ROCK CHECK DAM
NOT TO SCALE



STONE TOE STABILIZATION
SCALE: NTS

GARY MICHAEL MRYNCZA
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	REVISIONS		

TENNESSEE STREAM TSMP MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 C-ADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

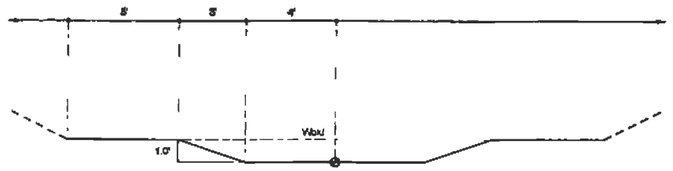
MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

DATE: JUNE 2013
SCALE: N T S

DETAILS: STREAM RESTORATION

SHEET 4 OF 19

MAY PRAIRIE STREAM
TYPICAL CROSS-SECTIONS - "C4/6" TYPE
STA 10+00 - 19+71
RIFFLE & POOL

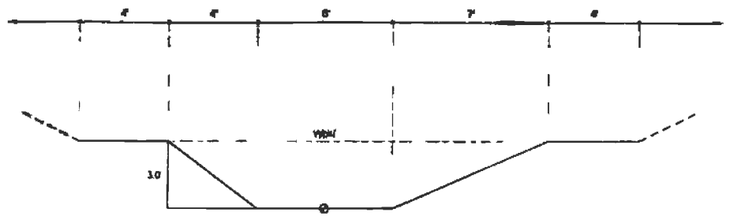


TIE BACK TO EXISTING GRADE AT 0:1 - 3:1 SLOPE (TYPICAL)

Ø = THALWEG LOCATION

TYPICAL RIFFLE

NOTE: RIFFLE CROSS-SECTION IS SYMMETRICAL.



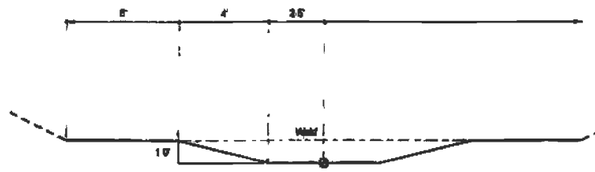
TIE BACK TO EXISTING GRADE AT 0:1 - 3:1 SLOPE (TYPICAL)

Ø = THALWEG LOCATION

TYPICAL POOL - LEFT MEANDER

NOTE: MIRROR SECTION FOR RIGHT MEANDERS

MAY PRAIRIE STREAM
TYPICAL CROSS-SECTIONS - "C4/6" TYPE
STA 19+71 - 34+81
RIFFLE & POOL

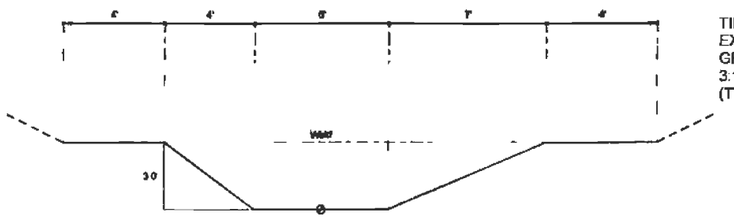


TIE BACK TO EXISTING GRADE AT 0:1 - 3:1 SLOPE (TYPICAL)

Ø = THALWEG LOCATION

TYPICAL RIFFLE

NOTE: RIFFLE CROSS-SECTION IS SYMMETRICAL



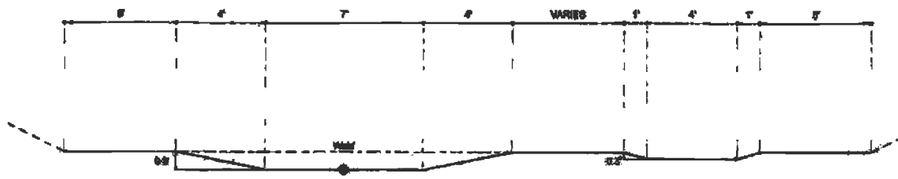
TIE BACK TO EXISTING GRADE AT 0:1 - 3:1 SLOPE (TYPICAL)

Ø = THALWEG LOCATION

TYPICAL POOL - LEFT MEANDER

NOTE: MIRROR SECTION FOR RIGHT MEANDERS

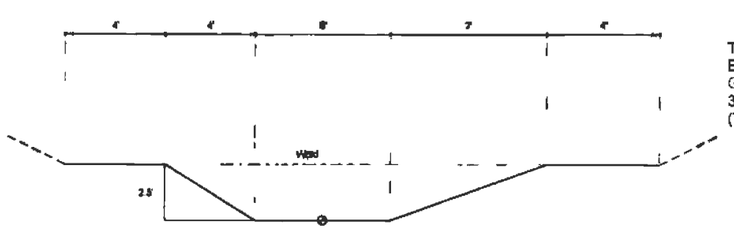
MAY PRAIRIE STREAM
TYPICAL CROSS-SECTIONS - "C4/6" TYPE
STA 34+81 - 56+81
RIFFLE & POOL



TIE BACK TO EXISTING GRADE AT 0:1 - 3:1 SLOPE (TYPICAL)

Ø = THALWEG LOCATION

TYPICAL RIFFLE



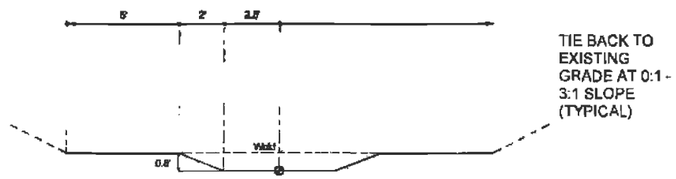
TIE BACK TO EXISTING GRADE AT 0:1 - 3:1 SLOPE (TYPICAL)

Ø = THALWEG LOCATION

TYPICAL POOL - LEFT MEANDER

NOTE: MIRROR SECTION FOR RIGHT MEANDERS

UT TO MAY PRAIRIE STREAM
TYPICAL CROSS-SECTIONS - "C4/6" TYPE
STA 60+00 - 61+06
RIFFLE & POOL

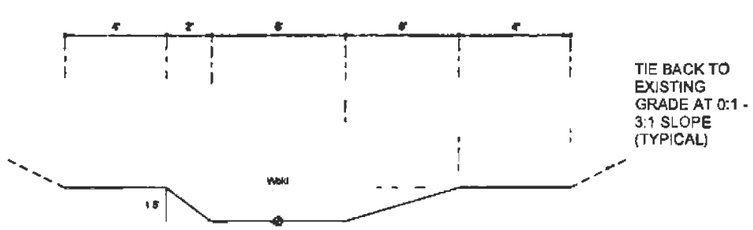


TIE BACK TO EXISTING GRADE AT 0:1 - 3:1 SLOPE (TYPICAL)

Ø = THALWEG LOCATION

TYPICAL RIFFLE

NOTE: RIFFLE CROSS-SECTION IS SYMMETRICAL



TIE BACK TO EXISTING GRADE AT 0:1 - 3:1 SLOPE (TYPICAL)

Ø = THALWEG LOCATION

TYPICAL POOL - LEFT MEANDER

NOTE: MIRROR SECTION FOR RIGHT MEANDERS

-3 -1.5 0 3 6

PLANS

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

REVISIONS

NO.	DESCRIPTION	DATE

TENNESSEE STREAM TSMP MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

DATE: MAY 20133
SCALE: GRAPHIC

TYPICAL CROSS-SECTION

TENNESSEE STREAM MITIGATION PROGRAM
STANDARD UNITS OF MEASUREMENT

SUMMARY OF QUANTITIES

ITEM	DESCRIPTION	QUANTITY	UNIT
1	Mobilization	1	LS
2	Construction Survey/Stake-Out	1	LS
3	Clearing and Grubbing	4.0	AC
4	Stream Excavation	3,500	CY
5	Floodplain Excavation/Grading	4,500	CY
6	On-Road Hauling		CY
7	Debris Removal	1	LS
8	Topsoil (removal, temp. stockpile, replacement)	2,300	CY
9	Toe Wood with Soil Lift	460	LF
10	TDOT Class A-3 Machined Rip Rap	783	Tons
11	TDOT Class B Machined Rip Rap	150	Tons
12	Surge Stone	120	Tons
13	Crusher Run Stone	80	Tons
14	Filter Fabric	2,000	SY
15	Coir Fiber Matting (Woven)	6,500	SY
16	Coir Fiber Matting (Nonwoven)	4,765	SY
17	Pump-Around	1	LS
18	Temporary Silt Fence	2,500	LF
19	Dewatering	1	LS
20	Soil Lifts	426	LF
21	Riparian Plantings (Bare Root)	1,400	Each
22	Live Stakes	6,000	Each
23	Temporary Seeding	350	LB
24	Permanent Seeding	175	LB
25	Straw Mulching	550	Bales
26	Invasive Species Control	1	LS
27	Reinforced Concrete Pipe Culvert	4	Each
28	Demobilization	1	LS

GARY MICHAEL MRYNCZA
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REVISIONS

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KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

DATE: JUNE 2013
SCALE: N.T.S

SUMMARY SHEET

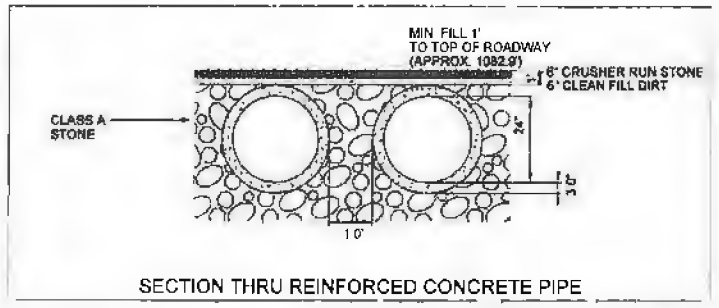
SHEET 6 OF 19

-40 -20 0 40 80

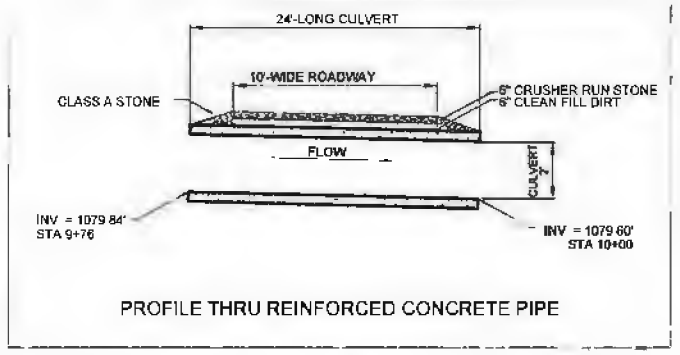
MATCHLINE - SEE SHEET 8

CONSTRUCT PLUNGE POOL WITH CLASS A STONE AT CULVERT OUTLET, SEE PROFILE FOR POOL DIMENSIONS

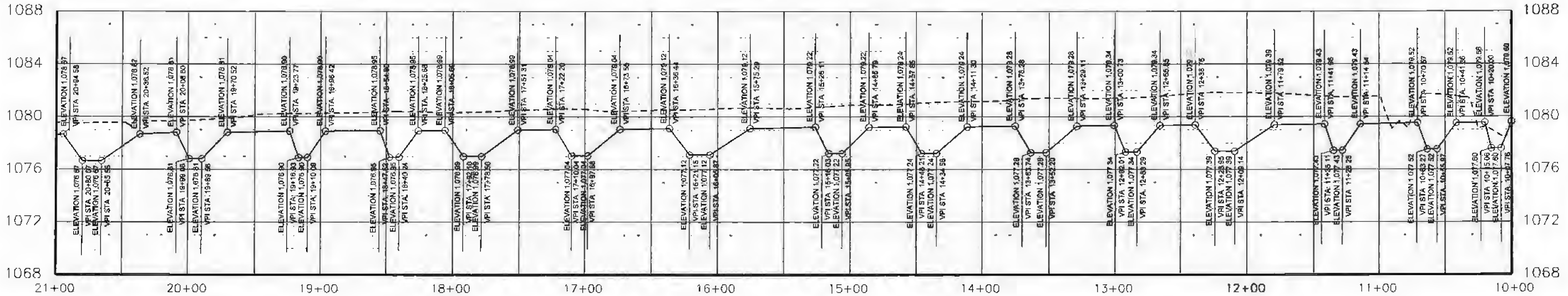
FILL EXISTING CHANNEL INTERMITTENTLY WITH ANY ADJACENT SPOIL AND EXCAVATED SOIL FROM RESTORED CHANNEL



SECTION THRU REINFORCED CONCRETE PIPE



PROFILE THRU REINFORCED CONCRETE PIPE



GARY MICHAEL MRYNCZA
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NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

TENNESSEE STREAM TSMP MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT

COFFEE COUNTY, TENNESSEE

STATION 10+00 - 19+73

DATE: JUNE 2013

SCALE: GRAPHIC

PLAN AND PROFILE

SHEET 7 OF 19

-40 -20 0 40 80

FILL DITCHES INTERMITTENTLY WITH ANY ADJACENT SPOIL AND EXCAVATED SOIL FROM RESTORED CHANNEL

MATCHLINE - SEE SHEET 9

FILL OPEN CHANNEL WITH LOGS/BRUSH/FILL TO ELEVATION = 1075.3'

FILL DITCHES INTERMITTENTLY WITH ANY ADJACENT SPOIL AND EXCAVATED SOIL FROM RESTORED CHANNEL

FILL EXISTING CHANNEL INTERMITTENTLY WITH ANY ADJACENT SPOIL AND EXCAVATED SOIL FROM RESTORED CHANNEL

UNNAMED TRIBUTARY

MATCHLINE - SEE SHEET 7

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

UNNAMED TRIBUTARY PROFILE

1088 1084 1080 1076 1072 1068

62+00 61+00 60+00

MAY PRAIRIE STREAM PROFILE

1088 1084 1080 1076 1072 1068

31+00 30+00 29+00 28+00 27+00 26+00 25+00 24+00 23+00 22+00 21+00 20+00

REVISIONS			
STM	DESCRIPTION	DATE	APPROVED

TENNESSEE STREAM MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 19+73 - 30+40

DATE: JUNE 2013
SCALE: GRAPHIC

PLAN AND PROFILE

SHEET 8 OF 19

-40 -20 0 40 80

NOTE: SECONDARY CHANNELS WILL BE GRADED AS DIRECTED BY THE ENGINEER IN THE FIELD.

REMOVE DEAD SNAG FROM CHANNEL

WIDEN RIGHT SIDE OF EXISTING CROSS-SECTION TO MORE CLOSELY MATCH TYPICAL SECTION

MATCHLINE - SEE SHEET 10

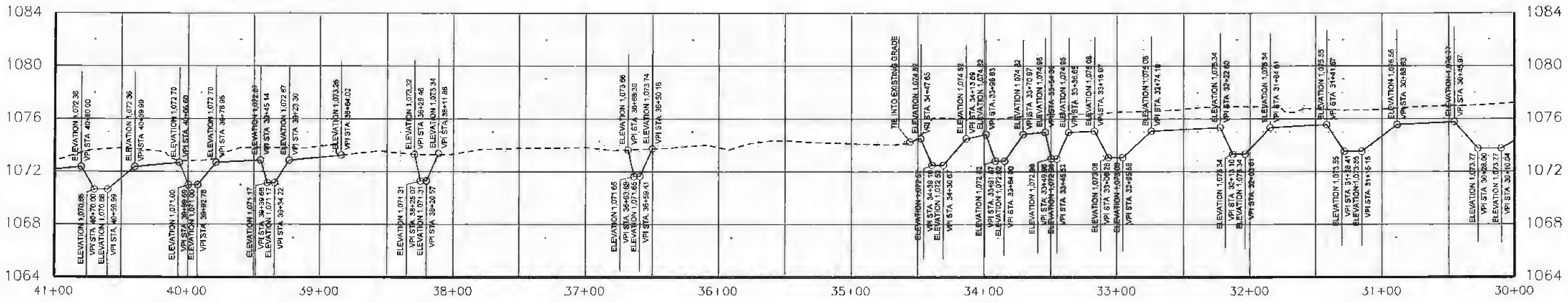
MATCHLINE - SEE SHEET 8

CHANNEL BLOCK TO BE BUILT TO ALLOW FLOW FROM UPSTREAM SWALE AT ELEVATION = 1075.3'

FILL OPEN CHANNEL WITH LOGS/BRUSH/FILL TO ELEVATION = 1075.3'

INSTALL LOW BERMS TO MAINTAIN PRIMARY FLOW IN RESTORED CHANNEL. FINAL BERM ELEVATIONS TO BE DETERMINED BY THE ENGINEER IN THE FIELD

EXCAVATE VERNAL POOL TO ENHANCE OFFLINE DEEP WATER HABITAT



GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
DEPARTMENT OF AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

REVISIONS

NO.	DATE	APPROVED

TENNESSEE STREAM TSMP MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 30+40 - 41+00

DATE: JUNE 2013
SCALE: GRAPHIC

PLAN AND PROFILE

SHEET 9 OF 19

-40 -20 0 40 80

MATCHLINE - SEE SHEET 11

NOTE: SECONDARY CHANNELS WILL BE GRADED AS DIRECTED BY THE ENGINEER IN THE FIELD

HILLSBORO HIGHWAY
HIGHWAY 41

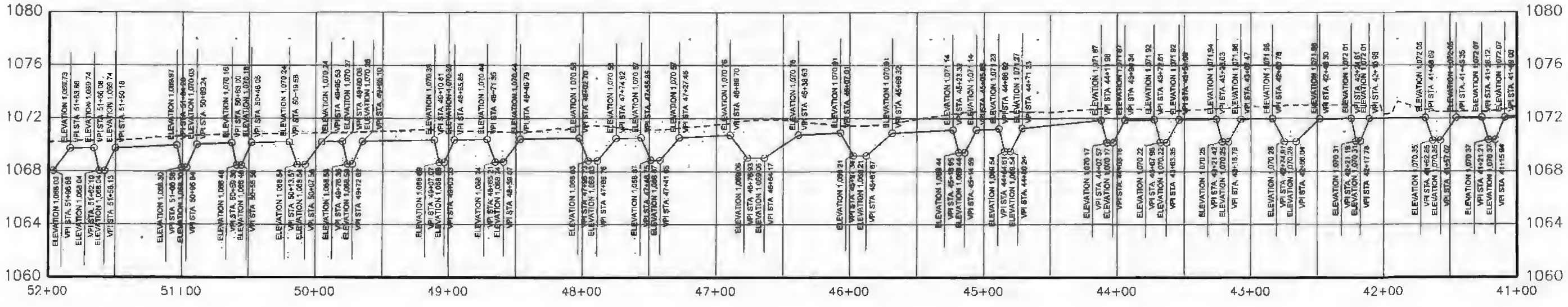
BERM ELEVATION = APPROX 1071 5'

TDOT RIGHT OF WAY
NOTE: ALSO STAKED IN THE FIELD

BERM ELEVATION = APPROX 1073'

MATCHLINE - SEE SHEET 9

BERM/STREAM FILL LOCATIONS ARE APPROXIMATE. EXACT LOCATIONS TO BE DETERMINED BY ENGINEER IN THE FIELD. SOME AREAS WILL BE LEFT OPEN TO PROVIDE EPHEMERAL POOL HABITAT.



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AGRICULTURE
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No. 111554
STATE OF TENNESSEE

REVISIONS

NO.	DESCRIPTION	DATE	APPROVED

TENNESSEE STREAM MITIGATION PROGRAM

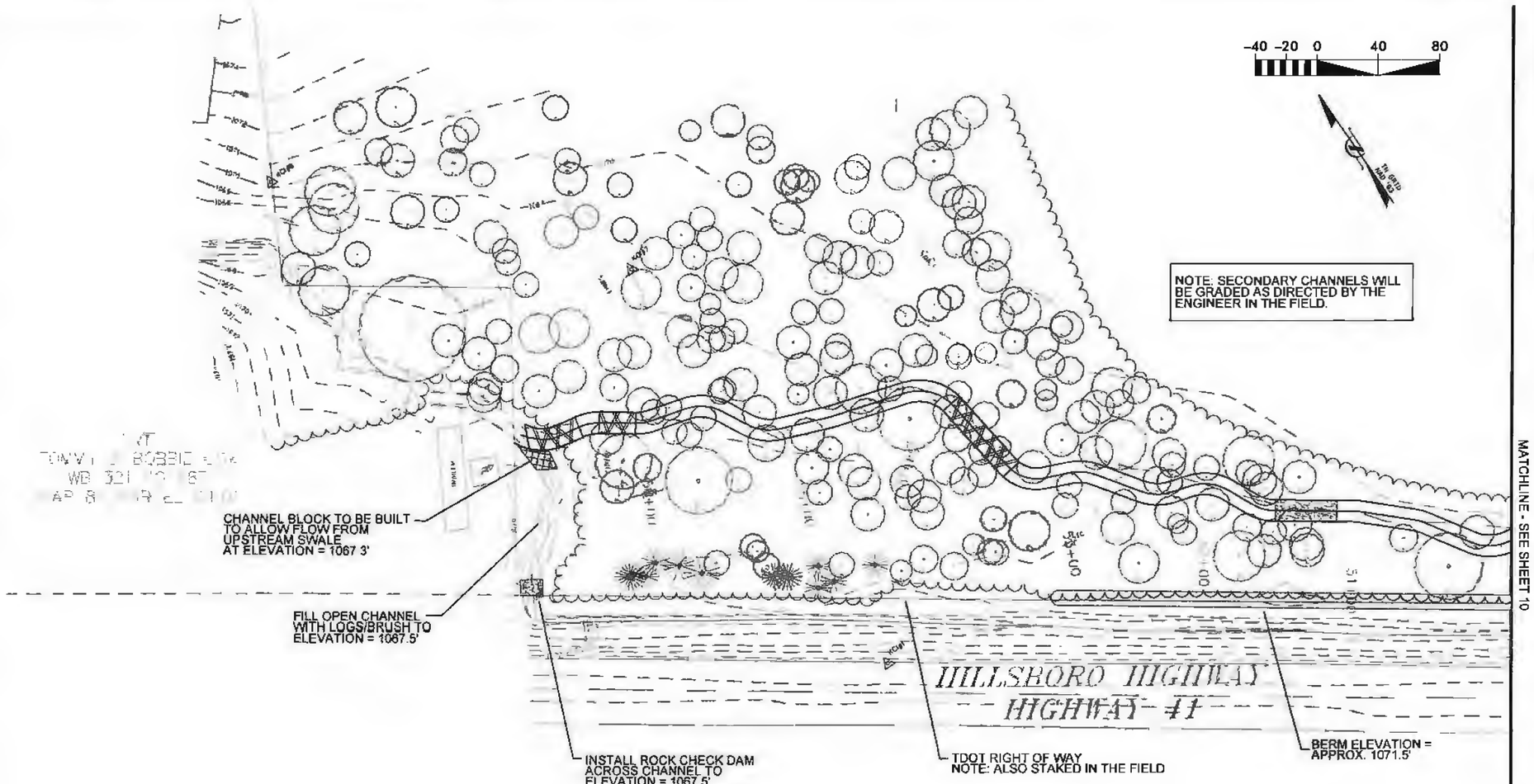
KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

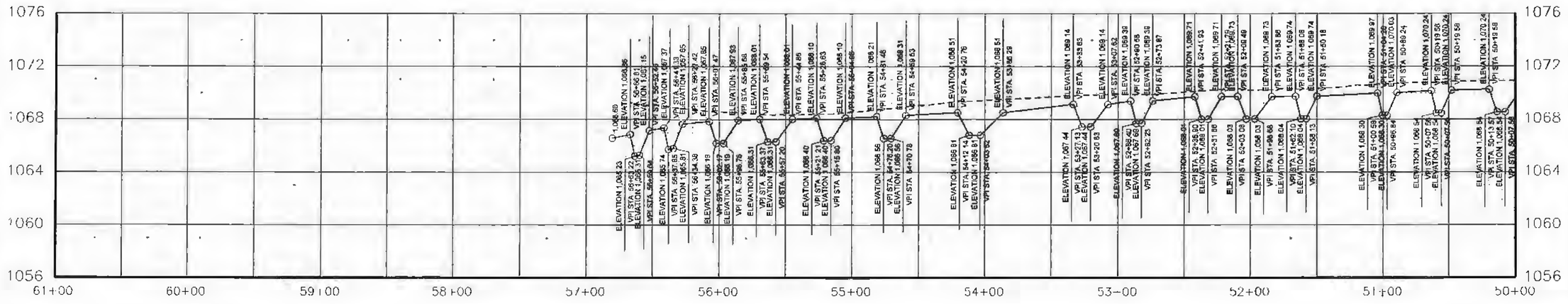
MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 41+00 - 49+93

DATE: JUNE 2013
SCALE: GRAPHIC

PLAN AND PROFILE

SHEET 10 OF 19





GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

REVISIONS

DESCRIPTION	DATE	APPROVED

TENNESSEE STREAM TSMP MITIGATION PROGRAM

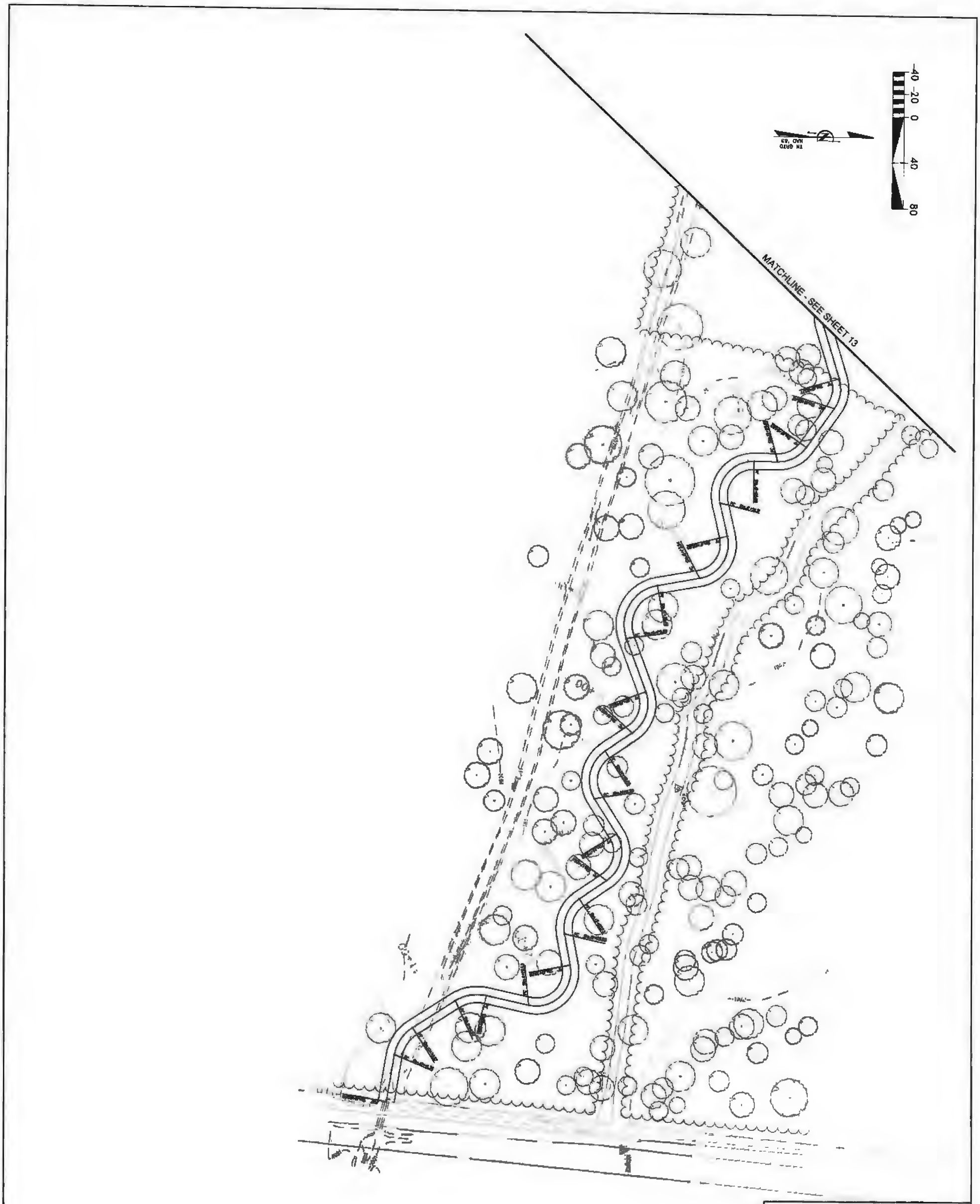
KCI TECHNOLOGIES
7035 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 49+93 - 56+80

DATE: JUNE 2013
SCALE: GRAPHIC

PLAN AND PROFILE

SHEET 11 OF 19



STATE OF TENNESSEE
GARY MICHAEL MARYNCZA
REGISTERED ENGINEER
No. 111554
COMMERCE & AGRICULTURE

STREAM GEOMETRY

SHEET 12 OF 19

DATE: JUNE 2013

SCALE: GRAPHIC

MAY PRAIRIE
STREAM RESTORATION PROJECT

COFFEE COUNTY, TENNESSEE

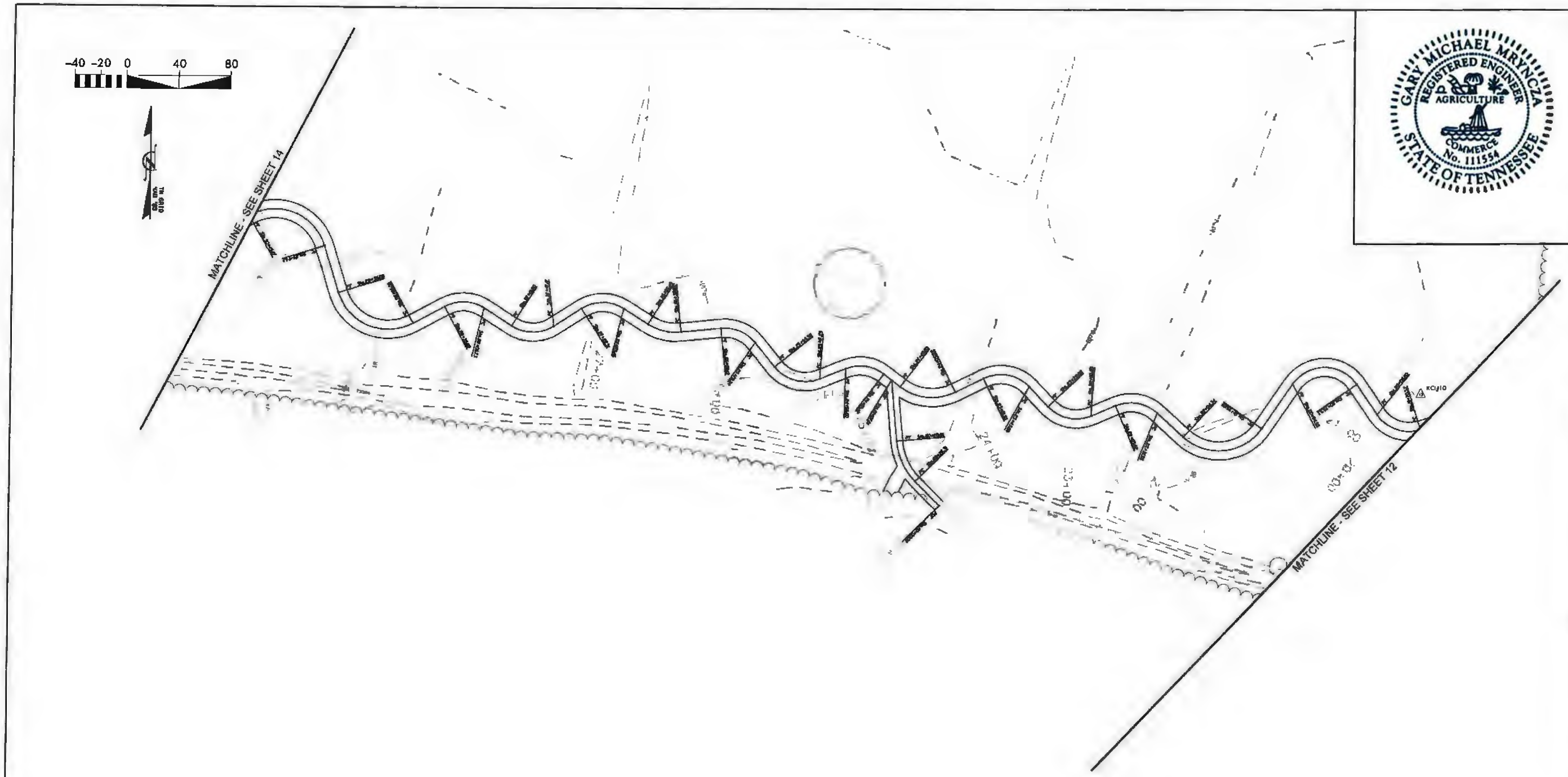
STATION 10+00 - 19+73

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

TENNESSEE STREAM TSMP MITIGATION PROGRAM

NO.	DESCRIPTION	DATE	APPROVED

REVISIONS



GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

TENNESSEE STREAM TSMP MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 19+73 - 30+40

DATE: JUNE 2013
SCALE: GRAPHIC

STREAM GEOMETRY

SHEET 13 OF 19

-40 -20 0 40 80

MATCHLINE - SEE SHEET 15

MATCHLINE - SEE SHEET 13

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

REVISIONS

NO.	DESCRIPTION	DATE

TENNESSEE STREAM TSMP MITIGATION PROGRAM

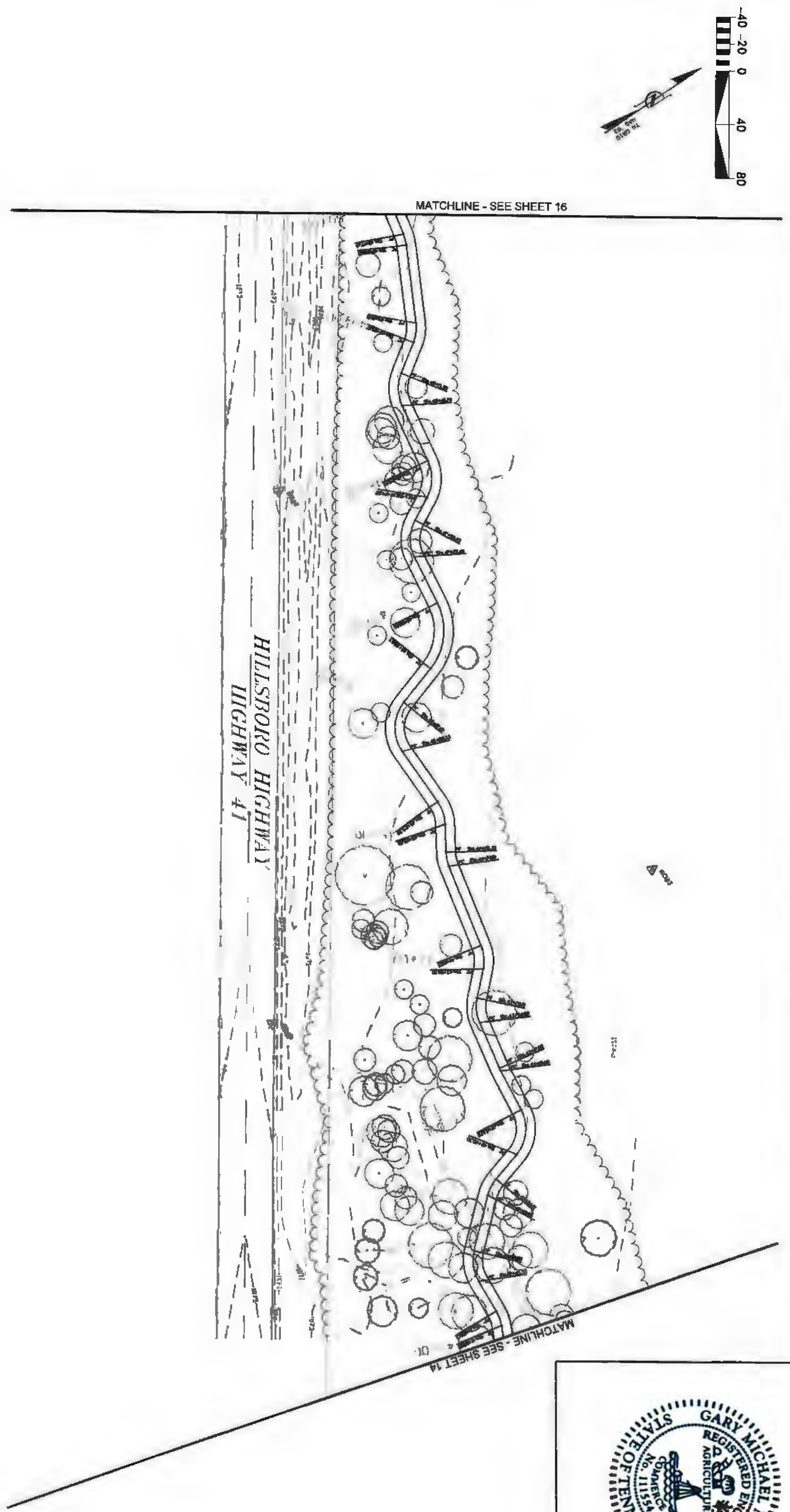
KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 30+40 - 41+00

DATE: JUNE 2013
SCALE: GRAPHIC

STREAM GEOMETRY

SHEET 14 OF 19



STATE OF TENNESSEE
GARY MICHAEL MARENCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554

STREAM GEOMETRY

SHEET 15 OF 19

DATE: JUNE 2013
SCALE: GRAPHIC

MAY PRAIRIE
STREAM RESTORATION PROJECT

COFFEE COUNTY, TENNESSEE

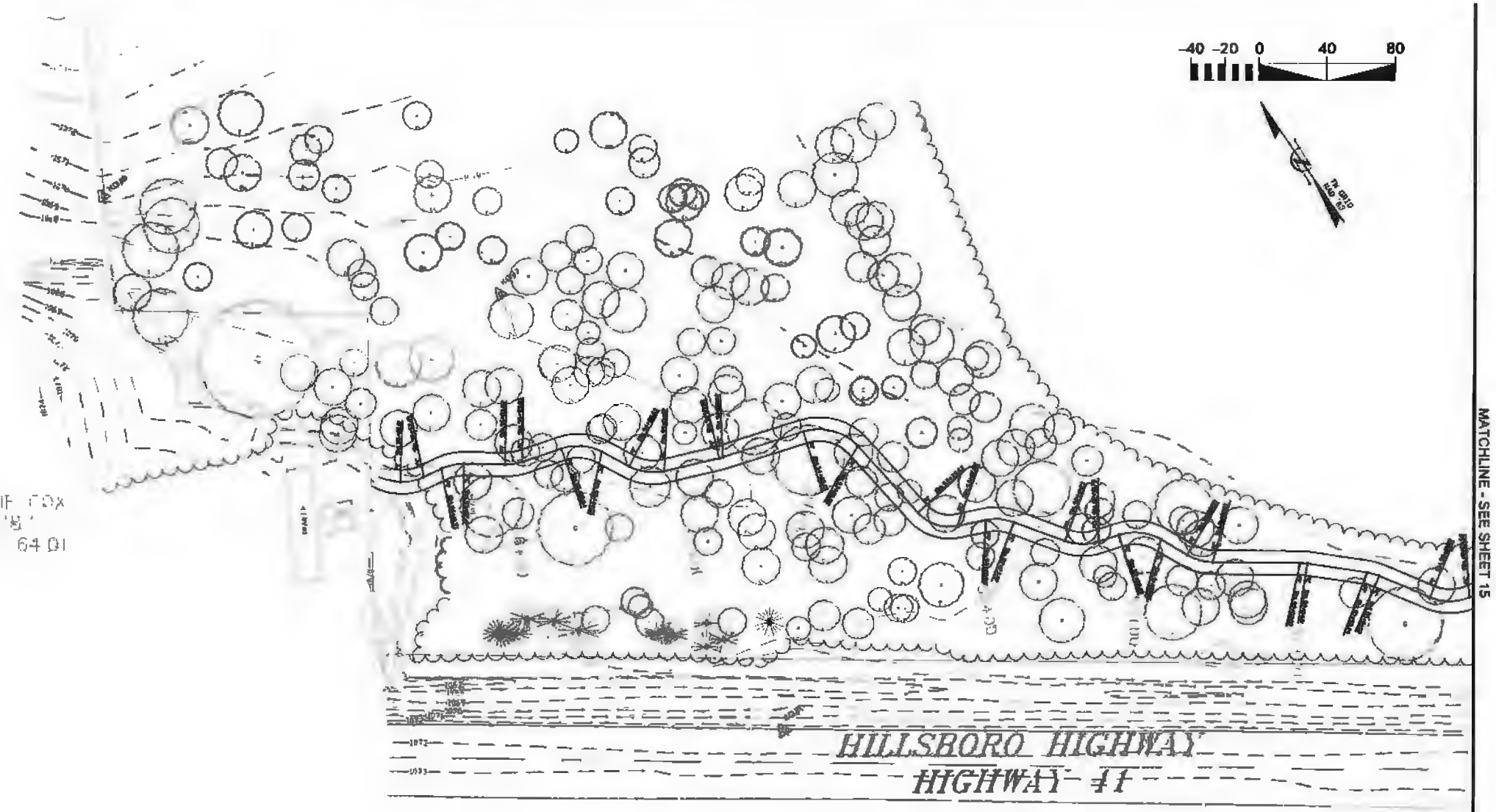
STATION 41+00 - 49+93

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

TENNESSEE STREAM TSMP MITIGATION PROGRAM

NO.	DESCRIPTION	DATE	APPROVED

REVISIONS



MATCHLINE - SEE SHEET 15

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

TENNESSEE STREAM TSMP MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 49+93 - 56+67

DATE: JUNE 2013
SCALE: GRAPHIC

STREAM GEOMETRY

SHEET 16 OF 19

	COMMON NAME	SCIENTIFIC NAME	STRATUM	INDICATOR STATUS	SPACING (FT)	PLANTING TYPE	STEMS/ ACRE	TOTAL AREA (ACRES)	TOTAL STEMS
ZONE 1	BLACK WILLOW	SALIX NIGRA	MIDSTORY	OBL	3x3	LIVE STAKE	4,840	0.6	3,018
	SILKY WILLOW	SALIX SERICEA	UNDERSTORY	OBL	3x3	LIVE STAKE	4,840	0.6	
	SILKY DOGWOOD	CORNUS AMOMUM	UNDERSTORY	FACW+	3x3	LIVE STAKE	4,840	0.6	

NOTES:

1 NO SINGLE LIVE STAKING SPECIES SHALL COMPOSE MORE THAN 40% OF THE 3,018 TOTAL NUMBER OF LIVE STAKES TO BE INSTALLED

2 LIVE STAKES: 1.5' TO 2' LENGTHS, 1/2" TO 2" DIAMETER 3' CENTER SPACING IN MEANDER BENDS UP TO BANKFULL. 4' TO 5' CENTER SPACING IN STRAIGHT AREAS, RANDOM SPECIES PLACEMENT ALONG STREAM BANKS

3 LIVE STAKES: IN PRAIRIE AREA, ONLY INSTALL LIVESTAKES IN OUTSIDE MEANDER BENDS BETWEEN THE PC AND PT

	COMMON NAME	SCIENTIFIC NAME	STRATUM	INDICATOR STATUS	SPACING (FT)	PLANTING TYPE	STEMS/ ACRE	AREA (ACRES)	COMPOSITION (%)	TOTAL STEMS
ZONE 2	PERSIMMON	DIOSPYROS VIRGINIANA	OVERSTORY	FAC	12x12	BARE ROOT	303	5.9	10	180
	WILLOW OAK	QUERCUS PHELLOS	OVERSTORY	FACW	12x12	BARE ROOT	303	5.9	20	360
	WATER OAK	QUERCUS NIGRA	OVERSTORY	FACW	12x12	BARE ROOT	303	5.9	20	360
	SHUMARD OAK	QUERCUS SHUMARDII	OVERSTORY	FACW	12x12	BARE ROOT	303	5.9	20	360
	WINTERBERRY	ILEX VERTICILLATA	UNDERSTORY	FACW	12x12	BARE ROOT	303	5.9	15	270
	SPICEBUSH	LINDERA BENZOIN	UNDERSTORY	FACW	12x12	BARE ROOT	303	5.9	15	270
								TOTALS:	100	1,800

THERE WILL BE NO BAREROOT PLANTING IN THE PRAIRIE AREAS. BAREROOT TREES WILL ONLY BE PLANTED IN AREAS THAT WERE FORESTED PRIOR TO RESTORATION. PLANTING WILL ONLY OCCUR WHERE THERE HAS BEEN DISTURBANCE AND THE DISTURBANCE IS GREATER THAN 10' FROM AN EXISTING TREE. IT IS ASSUMED THAT MOST OF THE PLANTING WILL BE AMONG EXISTING TREES AND THAT THERE WILL BE VERY FEW AREAS THAT ARE COMPLETELY CLEARED

NOTES:

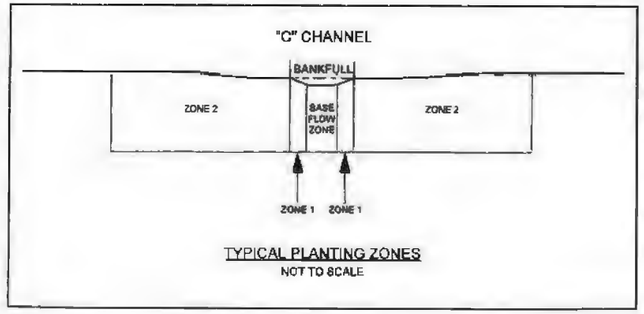
1 BARE ROOT MATERIAL SHALL BE 12" - 18", RANDOM SPECIES PLACEMENT

2 UNDISTURBED FORESTED AREAS WITHIN PLANTING ZONE WILL NOT BE PLANTED

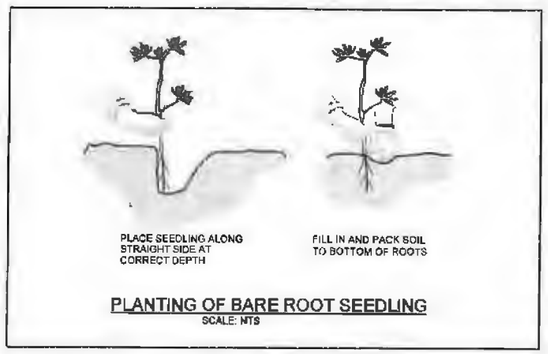
PLANTING PLAN LEGEND

ZONE 1

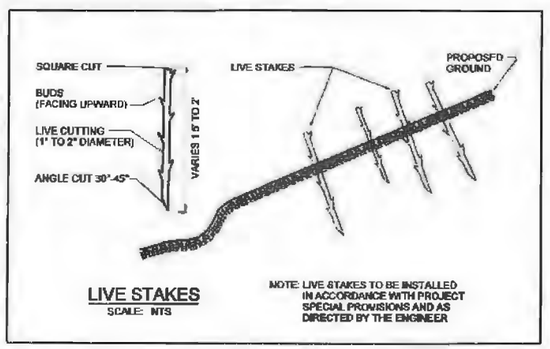
ZONE 2



TYPICAL PLANTING ZONES
NOT TO SCALE



PLANTING OF BARE ROOT SEEDLING
SCALE: NTS



LIVE STAKES
SCALE: NTS

NOTE: LIVE STAKES TO BE INSTALLED IN ACCORDANCE WITH PROJECT SPECIAL PROVISIONS AND AS DIRECTED BY THE ENGINEER

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

REVISIONS

NO.	DESCRIPTION	DATE	APPROVED

TENNESSEE STREAM TSMP MITIGATION PROGRAM

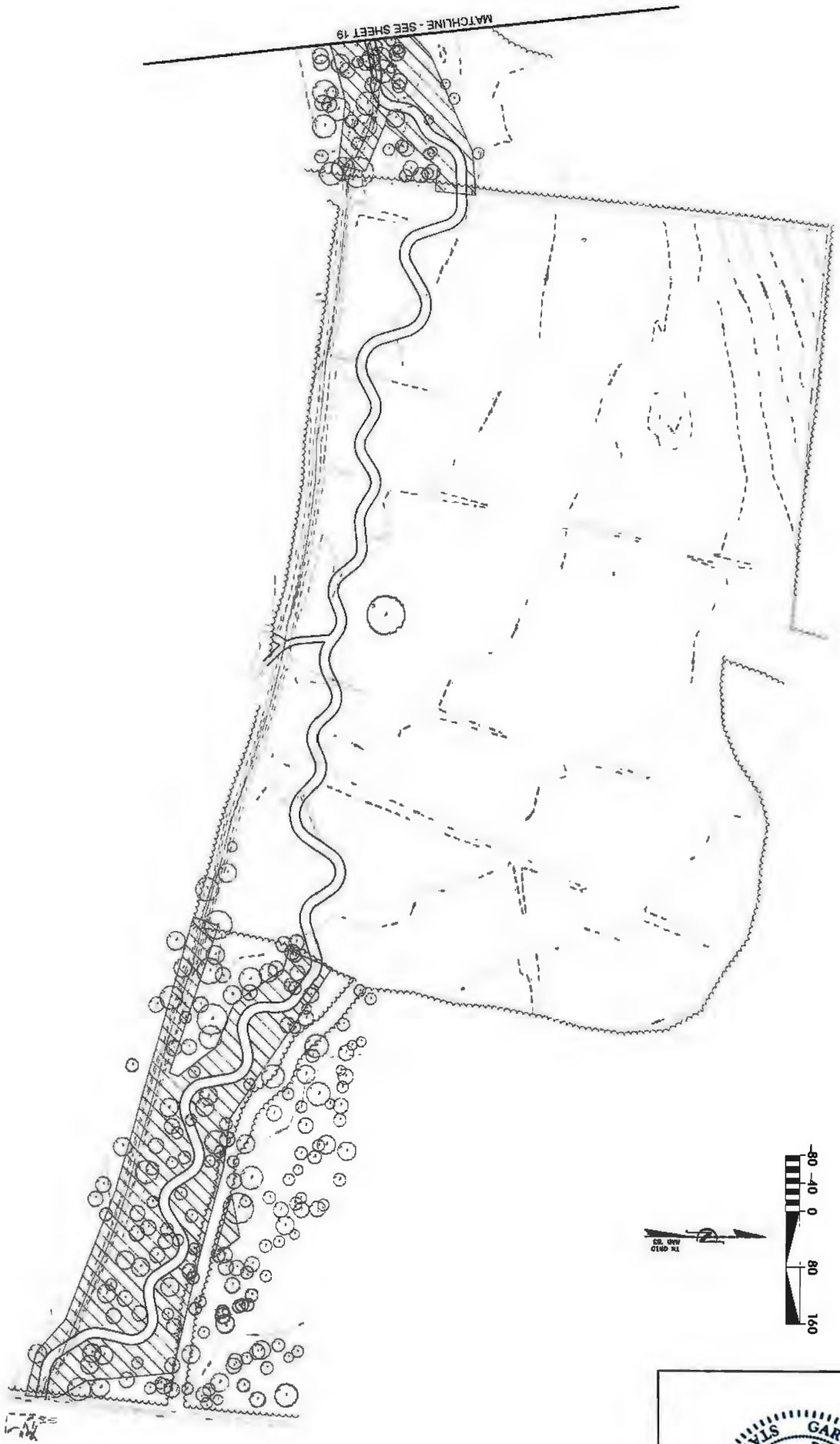
KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 19+73 - 30+40

DATE: JUNE 2013
SCALE: GRAPHIC

PLANTING PLAN

SHEET 17 OF 19



STATE OF TENNESSEE
GARY MICHAEL MARYNOCZA
REGISTERED ENGINEER
AGRICULTURE
No. 115554
COMMERCE

SHEET 18 OF 19

PLANTING PLAN

DATE: JUNE 2013
SCALE: GRAPHIC

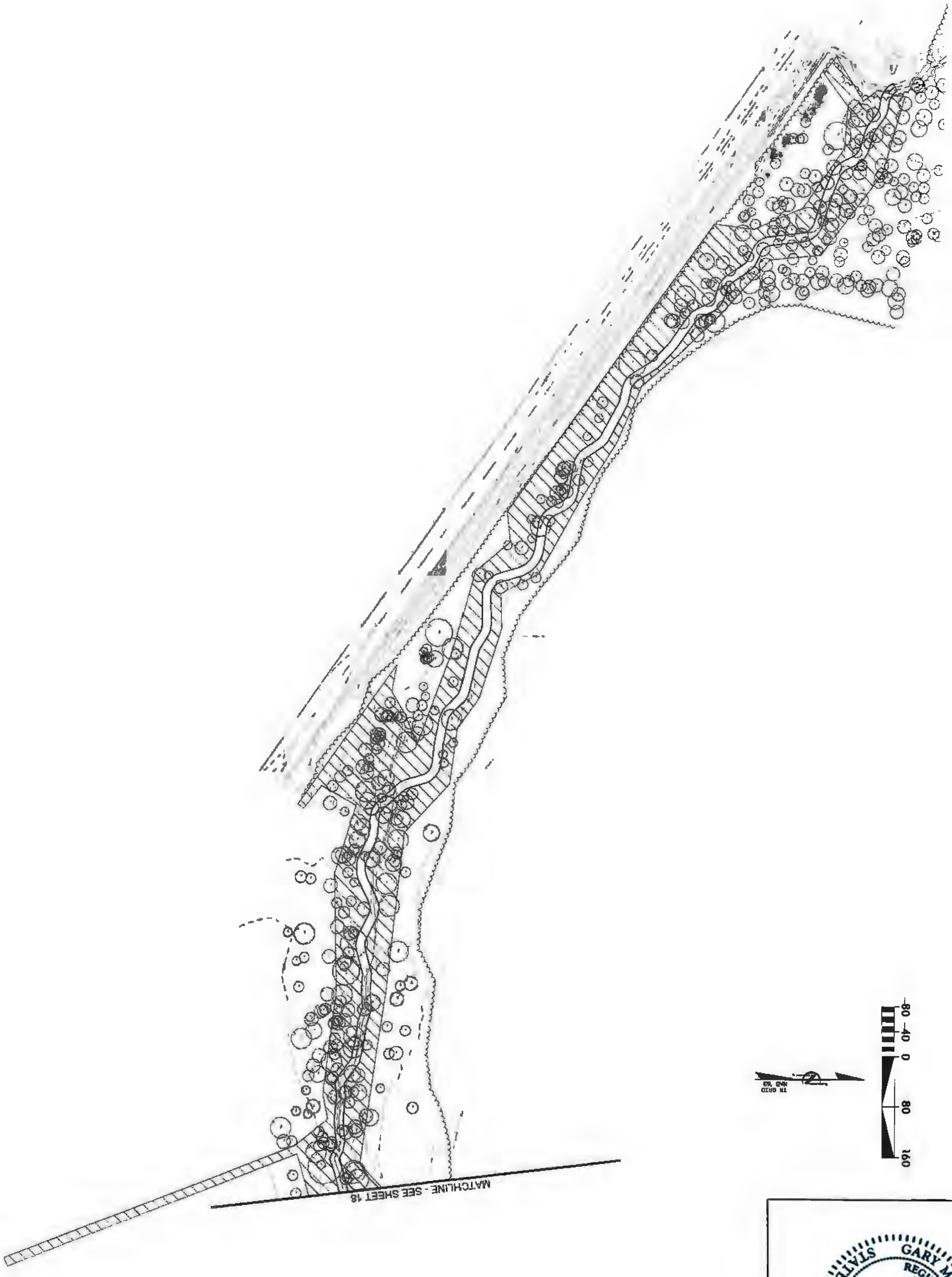
MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

KCI TECHNOLOGIES
1003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

TENNESSEE STREAM TSMP MITIGATION PROGRAM

SYM.	DESCRIPTION	DATE	APPROVED

REVISIONS



STATE OF TENNESSEE
GARY MICHAEL MARYNCZA
REGISTERED ENGINEER
No. 111554
COMMERCE & AGRICULTURE

SHEET 19 OF 19	PLANTING PLAN	DATE: JUNE 2013 SCALE: GRAPHIC

MAY PRAIRIE
STREAM RESTORATION PROJECT

COFFEE COUNTY, TENNESSEE

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

TENNESSEE STREAM TSMP MITIGATION PROGRAM

SYM	DESCRIPTION	DATE	APPROVED

REVISIONS

TSMP PROJECT#: 02-004-04

TENNESSEE STREAM MITIGATION PROGRAM

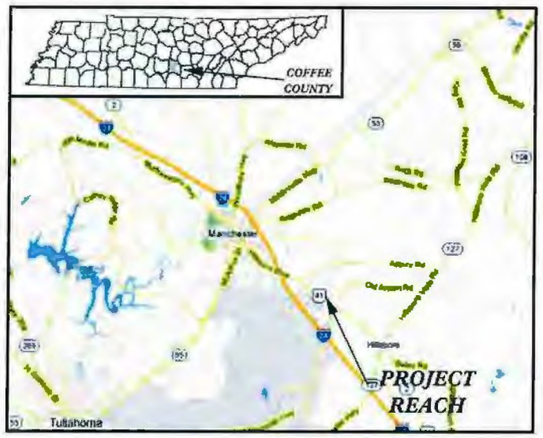
STATE	TSMP PROJECT#	SHEET NO.	TOTAL SHEETS
TN	02-004-04	1	14

NO.	REVISIONS	DATE	APPROVED
A	PRELIMINARY PLANS	06/2013	

MAY PRAIRIE STREAM RESTORATION

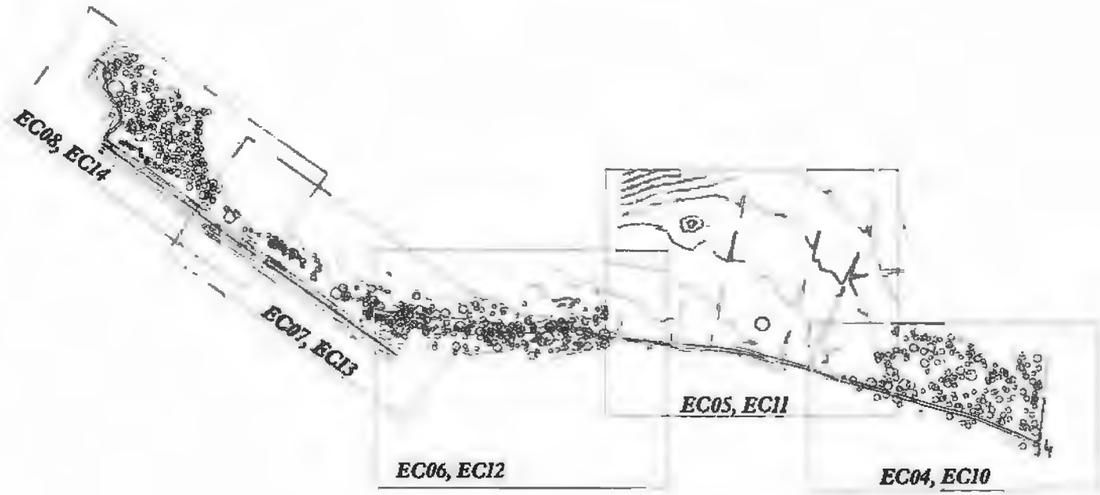
LOCATION: *A CONTINUOUS REACH OF AN UNNAMED TRIBUTARY IN THE MAY PRAIRIE STATE NATURAL AREA MANCHESTER, TENNESSEE*

TYPE OF WORK: *STREAM RESTORATION*



VICINITY MAP
NOT TO SCALE

ISSUING AGENCY	PERMIT #
USACE NWP27:	IN PROCESS
TDEC ARAP:	IN PROCESS
TDEC NPDES:	IN PROCESS



INDEX OF SHEETS

EROSION CONTROL PLANS

GRAPHIC SCALES

-40 -20 0 40 80
PLANS

PROJECT LENGTH

EXISTING CHANNEL
MAY PRAIRIE STREAM = 4,250 FEET
UNNAMED TRIBUTARY = 40 FEET
TOTAL LENGTH = 4,290 FEET

PROPOSED CHANNEL
MAY PRAIRIE STREAM = 4,667 FEET
UNNAMED TRIBUTARY = 106 FEET
TOTAL LENGTH = 4,773 FEET

Prepared in the Office of:

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

PROJECTED START DATE
SEPTEMBER 2013

PROJECTED COMP. DATE
DECEMBER 2013

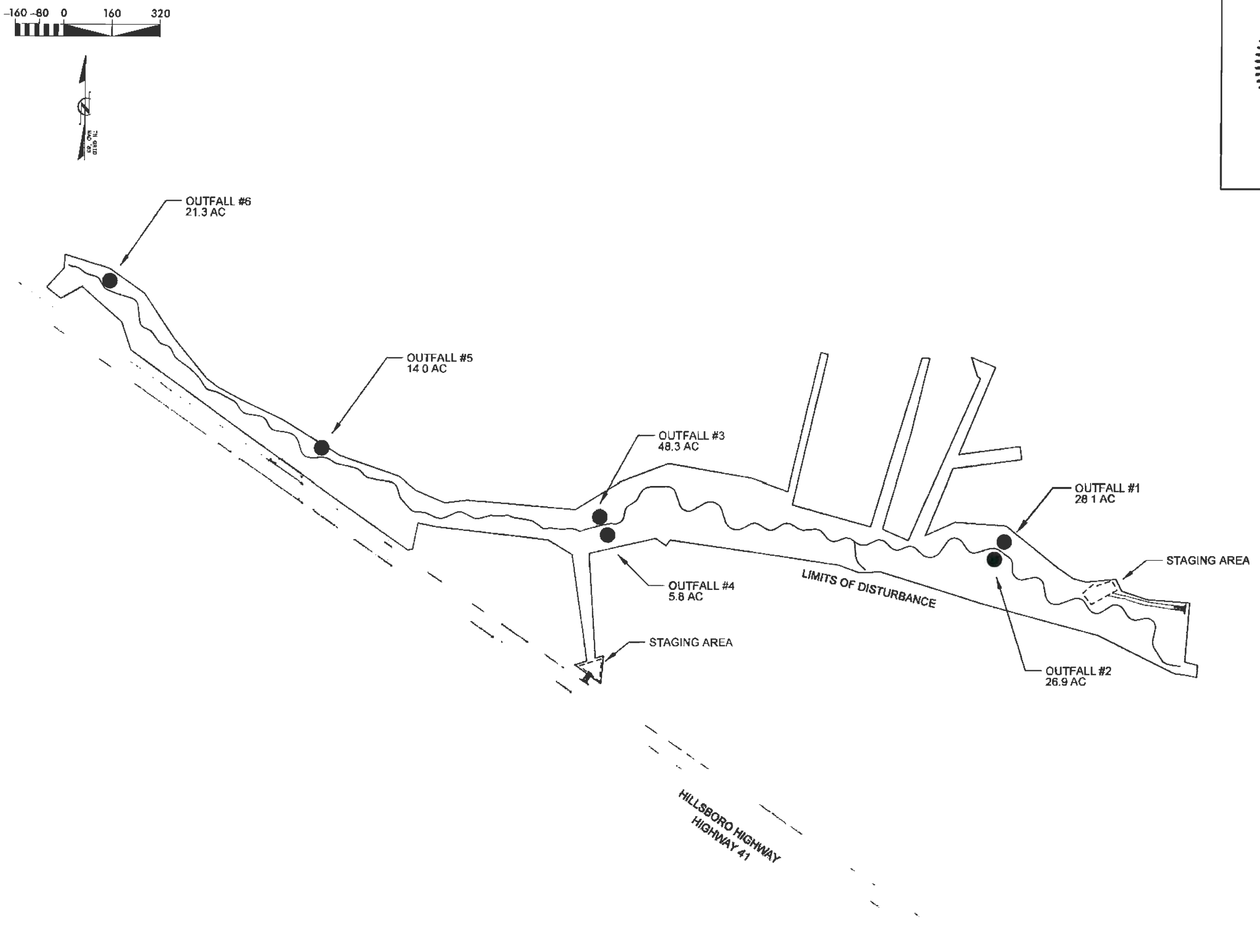
GARY M MRYNCZA, P E
PROJECT ENGINEER

GARY MICHAEL MRYNCZA REGISTERED ENGINEER AGRICULTURE NUMBER No. 111554 STATE OF TENNESSEE

Prepared for:

TENNESSEE STREAM TSMP MITIGATION PROGRAM

CHRIS CROCKETT
PROJECT MANAGER
(615) 691-2021



GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

NO.	DESCRIPTION	DATE	APPROVED
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TENNESSEE STREAM TSMP MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 345
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

SITE OVERVIEW

DATE: JUNE 2013
SCALE: GRAPHIC

EROSION CONTROL OVERVIEW

SHEET EC02 OF EC14

GENERAL NOTES:

SOIL TYPE: GUTHRIE SILT LOAM

RAIN GAUGE. CONTRACTOR SHALL BE RESPONSIBLE FOR HAVING A RAIN GAUGE ON THE PROJECT SITE AND FOR RECORDING DAILY RAINFALL AMOUNTS DURING CONSTRUCTION

SITE PRESERVATION AGREEMENT.
THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO EXISTING ROADS, GATES, FENCES, ETC. CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT ALL ACCESS LOCATIONS PER THE PLANS AND SPECIFICATIONS THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR ANY IMPROVEMENT TO THE ROAD CONDITION, GATES, AND FENCES, REQUIRED FOR ACCESS DURING CONSTRUCTION

THE CONTRACTOR SHALL INSTALL AND MAINTAIN THROUGHOUT THE PROJECT CONSTRUCTION ALL EROSION CONTROL MEASURES IN ACCORDANCE WITH THESE PLANS AND IN ACCORDANCE WITH APPLICABLE EROSION AND SEDIMENT CONTROL REGULATIONS THE CONTRACTOR SHALL CONTINUOUSLY MAINTAIN ALL EROSION CONTROL DEVICES AND STRUCTURES TO MINIMIZE EROSION.

ALL EROSION CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE TENNESSEE EROSION AND SEDIMENT CONTROL REGULATIONS, U S DEPARTMENT OF AGRICULTURE, AND U S. SOIL CONSERVATION SERVICE REGULATIONS

PRE-CONSTRUCTION EROSION CONTROL PLAN

LIMITS OF DISTURBANCE: 16 9 ACRES
SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE ANY UPSLOPE LAND DISTURBANCE TAKES PLACE

PRE-CONSTRUCTION SEQUENCE

A IDENTIFY PROJECT BOUNDARY, LIMITS OF DISTURBANCE, SENSITIVE AREAS, STAGING AREAS, STABILIZED ENTRANCES, CROSSINGS, AND ACCESS POINTS WITH THE ENGINEER

B CONSTRUCT ENTRANCES, CROSSINGS, AND STAGING AREAS IN A MANNER TO SUPPORT EXECUTION OF THE STREAM REMEDIATION IN PHASES AS INDICATED IN THE PLANS AND AS DIRECTED BY THE ENGINEER STOCKPILE TOPSOIL WHEN CONSTRUCTING THE STAGING AREA FOR FINAL STABILIZATION AFTER CONSTRUCTION IS COMPLETE

C INSTALL EROSION CONTROL DEVICES IN ACCORDANCE WITH THE SEDIMENT AND EROSION CONTROL PLANS AND AS DIRECTED BY THE ENGINEER.

SEDIMENT & EROSION CONTROL LEGEND

CONSTRUCTION ROADS.....

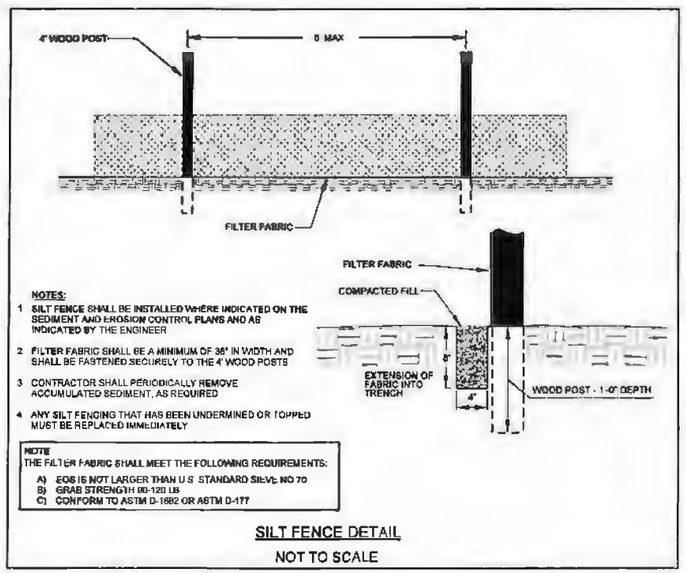
STABILIZED CONSTRUCTION ENTRANCE .....

SILT FENCE ..... SF

LIMITS OF DISTURBANCE ..... LOD

STAGING AREA .....

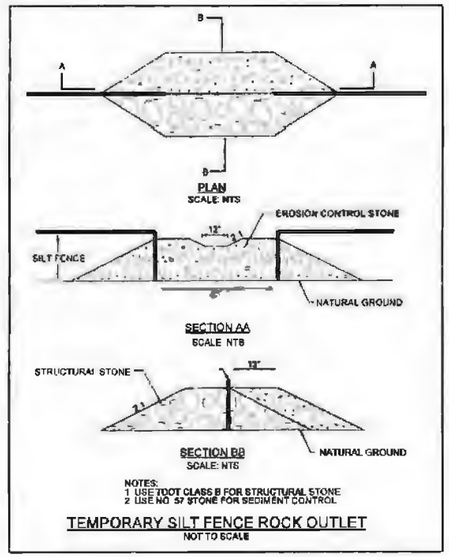
GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE



NOTES:
1 SILT FENCE SHALL BE INSTALLED WHERE INDICATED ON THE SEDIMENT AND EROSION CONTROL PLANS AND AS INDICATED BY THE ENGINEER
2 FILTER FABRIC SHALL BE A MINIMUM OF 36" IN WIDTH AND SHALL BE FASTENED SECURELY TO THE 4' WOOD POSTS
3 CONTRACTOR SHALL PERIODICALLY REMOVE ACCUMULATED SEDIMENT, AS REQUIRED
4 ANY SILT FENCING THAT HAS BEEN UNDERMINED OR TOPPED MUST BE REPLACED IMMEDIATELY

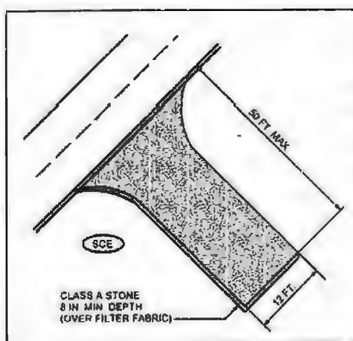
NOTE
THE FILTER FABRIC SHALL MEET THE FOLLOWING REQUIREMENTS:
A) EOS IS NOT LARGER THAN U S STANDARD SIEVE NO 70
B) GRAB STRENGTH 80-120 LB
C) CONFORM TO ASTM D-1682 OR ASTM D-177

SILT FENCE DETAIL
NOT TO SCALE



NOTES:
1 USE TDOT CLASS B FOR STRUCTURAL STONE
2 USE NO 57 STONE FOR SEDIMENT CONTROL

TEMPORARY SILT FENCE ROCK OUTLET
NOT TO SCALE



NOTES:
1 TURNING RADIUS SUFFICIENT TO ACCOMODATE LARGE TRUCKS SHALL BE PROVIDED
2 ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES
3 MUST BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS PERIODIC TOPDRESSING WITH STONE WILL BE NECESSARY
4 ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED UP IMMEDIATELY
5 GRAVEL CONSTRUCTION ENTRANCE SHALL BE LOCATED AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE MUST BE PROVIDED

STABILIZED CONSTRUCTION ENTRANCE
SCALE NTS

NO	DESCRIPTION	DATE	APPROVED
	REVISIONS		

TENNESSEE STREAM MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

DATE: JUNE 2013
SCALE: NOT TO SCALE

PRE-CONSTRUCTION EROSION CONTROL

SHEET EC03 OF EC14

-40 -20 0 40 80

MATCHLINE - SEE SHEET EC05

LOD

STAGING AREA

INSTALL STABILIZED CONSTRUCTION ENTRANCE WITH 12" RCP IN EXISTING DITCH ON 1% SLOPE

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
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No. 111554
STATE OF TENNESSEE

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TENNESSEE STREAM MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT

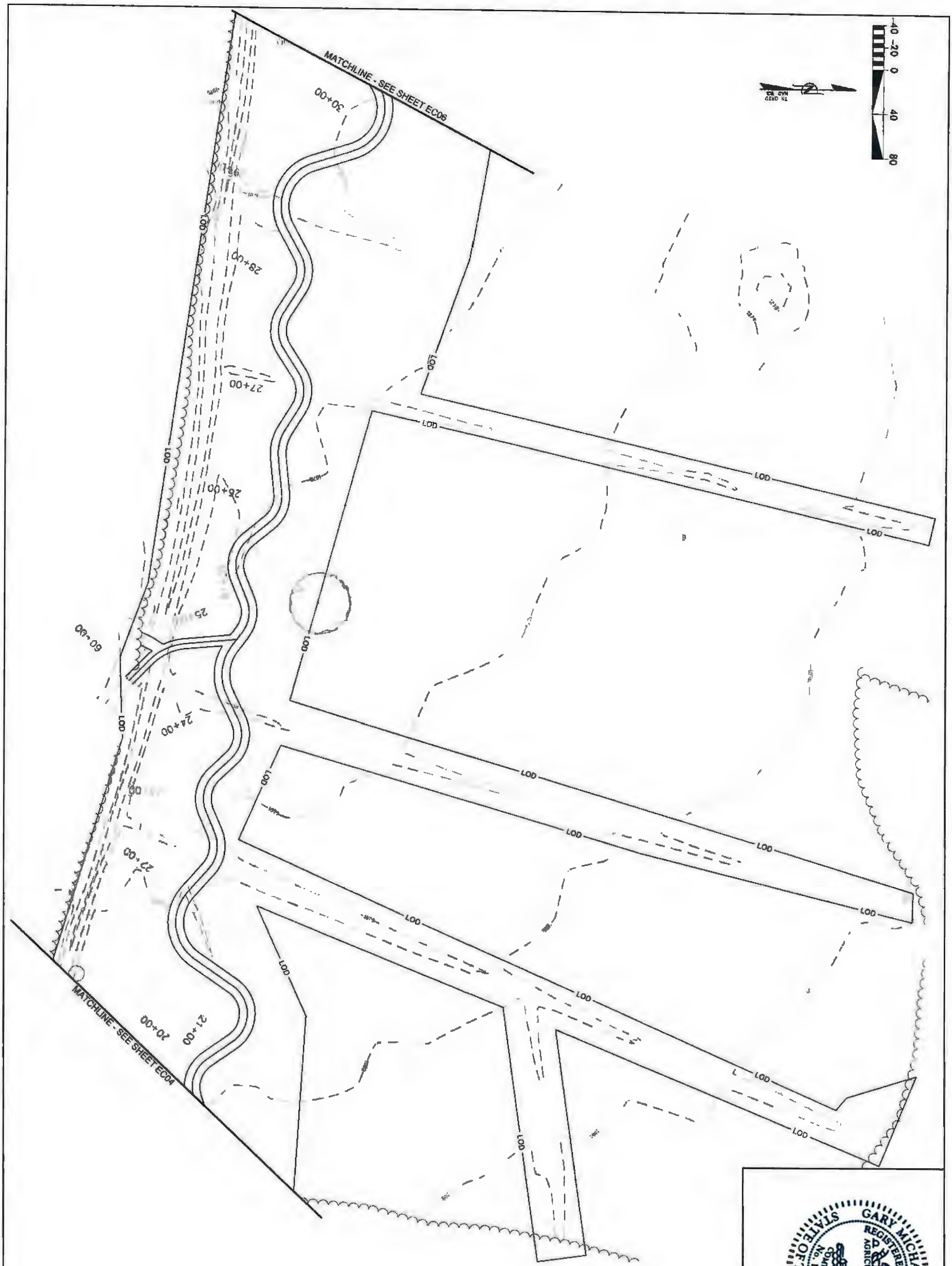
COFFEE COUNTY, TENNESSEE

STATION 10+00 - 19+73

DATE: JUNE 2013
SCALE: GRAPHIC

PRE-CONSTRUCTION EROSION CONTROL

SHEET EC04 OF EC14



MAY PRAIRIE
STREAM RESTORATION PROJECT

COFFEE COUNTY, TENNESSEE

STATION 19+73 - 30+40

PRE-CONSTRUCTION EROSION CONTROL

SHEET EC05 OF EC14

DATE: JUNE 2013

STATE: GRAPHIC

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

TENNESSEE STREAM TSMP MITIGATION PROGRAM

NO.	DESCRIPTION	DATE	APPROVED

REVISIONS

STATE OF TENNESSEE
GARY MICHAEL MARYNCZA
REGISTERED ENGINEER
AGRICULTURE
No. 111554

MATCHLINE - SEE SHEET EC07

MATCHLINE - SEE SHEET EC06

LOD

SE

STAGING AREA

INSTALL STABILIZED CONSTRUCTION ENTRANCE WITH 24" RCP IN EXISTING DITCH ON 1% SLOPE

HILLSBORO HIGHWAY
HIGHWAY 41

-40 -20 0 40 80

GRAPHIC SCALE

GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

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KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 30+40 - 41+00

DATE: JUNE 2013
SCALE: GRAPHIC

PRE-CONSTRUCTION EROSION CONTROL

SHEET EC08 OF EC14

-40 -20 0 40 80

MATCHLINE - SEE SHEET EC08

LOD

LOD

LOD

LOD

MATCHLINE - SEE SHEET EC08

HILLSBORO HIGHWAY
HIGHWAY 41

GARY MICHAEL MRYNCZA
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TENNESSEE STREAM TSMP MITIGATION PROGRAM

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7003 CHADWICK DRIVE, SUITE 343
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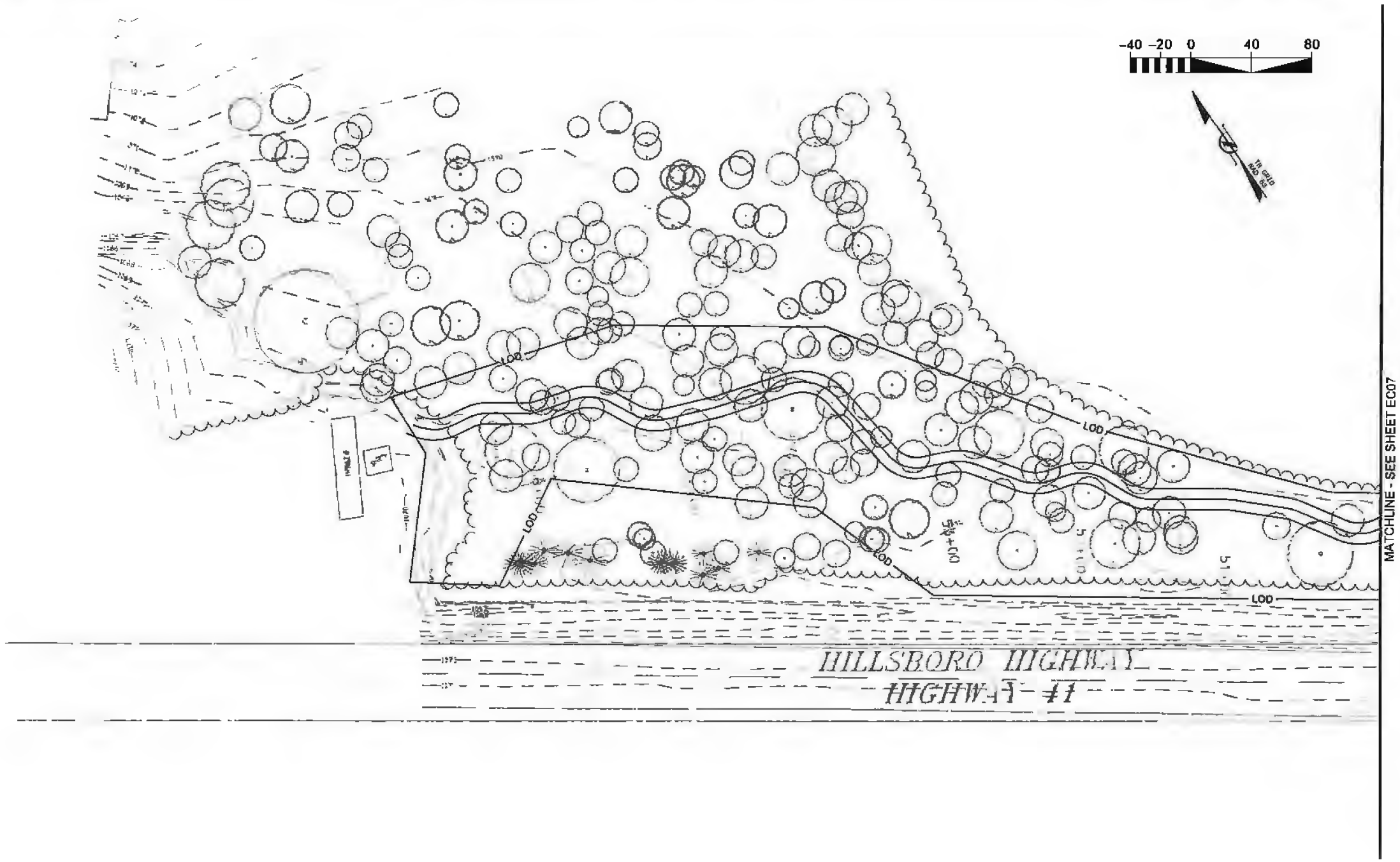
MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 41+00 - 49+93

DATE: JUNE 2013
SCALE: GRAPHIC

PRE-CONSTRUCTION EROSION CONTROL

SHEET EC07 OF EC14



GARY MICHAEL MRYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554
STATE OF TENNESSEE

NUM	DESCRIPTION	DATE	APPROVED
	REVISIONS		

TENNESSEE STREAM TSMP MITIGATION PROGRAM

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 49+93 - 58+80

DATE: JUNE 2013
SCALE: GRAPHIC

PRE-CONSTRUCTION EROSION CONTROL

SHEET EC08 OF EC14

INTERIM EROSION CONTROL PLAN

EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED CONTINUOUSLY, RELOCATED WHEN AND AS NECESSARY, AND SHALL BE CHECKED AFTER EVERY RAINFALL. SEEDED AREAS SHALL BE CHECKED REGULARLY AND SHALL BE WATERED, FERTILIZED, RESEEDED AND MULCHED AS NECESSARY TO OBTAIN A DENSE STAND OF GRASS.

STABILIZATION IS THE BEST FORM OF EROSION CONTROL. ALL DISTURBED AREAS THAT ARE NOT OTHERWISE STABILIZED SHALL BE AMENDED AND SEEDED, TEMPORARILY OR PERMANENTLY IN ACCORDANCE WITH THE TENNESSEE SEDIMENT CONTROL REGULATIONS. PERMANENT SEEDING AND GRASS ESTABLISHMENT ARE REQUIRED PRIOR TO PROJECT COMPLETION AND ACCEPTANCE.

CONTRACTOR SHALL PROVIDE GROUND COVER ON EXPOSED SLOPES WITHIN 14 CALENDAR DAYS FOLLOWING COMPLETION OF ANY PHASE OF GRADING. PERMANENT GROUND COVER FOR ALL DISTURBED AREAS SHALL BE PROVIDED WITHIN 14 CALENDAR DAYS FOLLOWING COMPLETION OF CONSTRUCTION.

WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE, THE ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. WHEN A CRUSHED STONE CONSTRUCTION ENTRANCE HAS BEEN COVERED WITH SOIL OR HAS BEEN PUSHED INTO THE SOIL BY CONSTRUCTION TRAFFIC, IT SHALL BE REPLACED WITH A DEPTH OF STONE EQUAL TO THAT OF THE ORIGINAL APPLICATION.

DURING CONSTRUCTION OF THE PROJECT, SOIL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.

SEQUENCE OF CONSTRUCTION FOR STREAM RESTORATION (TYPICAL)

THE CONTRACTOR SHALL ONLY CONDUCT STREAM WORK, INCLUDING ALL IN-STREAM STRUCTURES, GRADING, STABILIZATION MEASURES AND SEEDING AND MULCHING WORK, ON A SECTION OF STREAM THAT CAN BE ENTIRELY COMPLETED WITHIN A SINGLE DAY OR THE SECTION OF CHANNEL MUST BE BUILT OFFLINE, IN THE DRY, IF IT WILL NOT BE STABILIZED AT THE END OF THE DAY.

DUE TO THE HIGH WATER TABLE AT THE SITE, THERE IS THE POTENTIAL THAT CONSTRUCTION MAY HAVE TO OCCUR WHILE THE WORK AREA HAS STANDING WATER OR LIVE ACTIVE FLOW. IF THESE CONDITIONS EXIST, ADDITIONAL MEASURES SUCH AS SILT CURTAINS, DOWNSTREAM ROCK SILT SCREENS, OR OTHER DEVICES WILL BE USED TO REDUCE THE SEDIMENT IN THE STREAM FLOW CAUSED BY CONSTRUCTION. THESE MEASURES MUST BE APPROVED BY THE ENGINEER BEFORE CONSTRUCTION IN WET CONDITIONS OR THE ACTIVE FLOWING CHANNEL OCCURS. SIMILARLY TO OTHER WORKING CONDITIONS, IN THESE INSTANCES, THE WORK AREA MUST BE STABILIZED AT THE END OF THE DAY.

A. INITIATE STREAM CHANNEL WORK IF POSSIBLE IN AN OFFLINE, DRY SECTION OF CHANNEL THAT DOES NOT HAVE ACTIVE FLOW OR IN AN ONLINE SEGMENT OF STREAM THAT DOES NOT HAVE ACTIVE FLOW AND THAT CAN BE COMPLETED IN ONE DAY. STREAM WORK WILL INCLUDE EXCAVATION OF THE STREAMBED, EXCAVATION OF THE STREAM BANKS, AND INSTALLATION OF STABILIZATION MEASURES IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.
B. CLEAR AND STOCKPILE WOODY DEBRIS FROM BANKS AS INDICATED ON THE PLAN SHEETS AND AS DIRECTED BY THE ENGINEER. STOCKPILE ALL WOODY DEBRIS FOR USE IN CHANNEL STRUCTURES AND BANK STABILIZATION.
C. EXCAVATE AND GRADE CHANNEL ACCORDING TO THE PLAN AND PROFILE SHEETS. DEWATERING IS REQUIRED ANY TIME WORK IS CONDUCTED ON AN ONLINE SECTION OF CHANNEL.
D. STOCKPILE MATERIAL FOR BACKFILL USE LATER AS NECESSARY WITHIN THE LIMITS OF DISTURBANCE.
E. INSTALL BANK STABILIZATION TREATMENTS AND ANY IN-STREAM STRUCTURES.
F. PLANT, SEED AND MULCH WORK AREA USING TEMPORARY SEED MIXTURE.

INSPECTION SCHEDULE FOR OUTLETS
OUTLET POINTS ALONG MAY PRAIRIE ARE LABELED ON THE EROSION CONTROL PLANS.

EACH OUTLET WILL BE INSPECTED TWICE A WEEK WITH A MINIMUM OF 72 HOURS SEPARATION BETWEEN INSPECTIONS. IF A STORM EVENT IS PREDICTED FOR THE PROJECT AREA, THE OUTLETS SHALL BE INSPECTED BEFORE THE STORM TO ENSURE THEY ARE INTACT. AFTER A STORM EVENT THE OUTLETS MUST BE INSPECTED AND MAINTENANCE PERFORMED AS NECESSARY.

MULCHING:

SEEDED AREAS ARE TO BE PROTECTED BY SPREADING STRAW MULCH UNIFORMLY TO FORM A CONTINUOUS BLANKET (75% COVERAGE = 2 TONS/ACRE) OVER SEEDED AREAS. CONTRACTOR MAY PROPOSE ALTERNATE METHODS OF SEEDING AND MULCHING (HYDRO-SEEDING) UPON SUBMISSION TO THE ENGINEER OF CALCULATIONS SHOWING THE EQUIVALENCY OF THE PROPOSED METHOD.

GARY MICHAEL MRYNCZA
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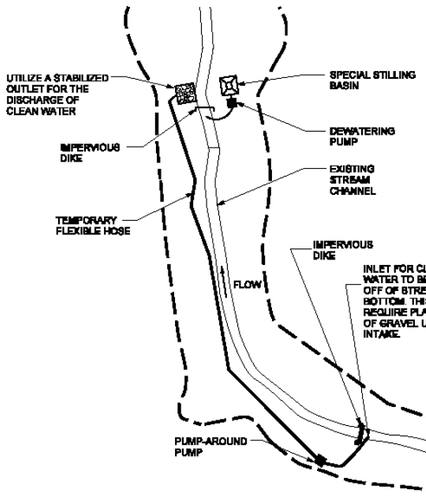
TEMPORARY SEED MIX (WINTER):

COMMON NAME	SCIENTIFIC NAME	PLANTING RATE PER ACRE (LBS)	AREA (ACRES)	TIME PERIOD	TOTAL (LBS)
WINTER RYE (RYE GRAIN)	SECALE CEREALE	30	16.9	11/1 -4/1	507
WINTER WHEAT	TRITICUM AESTIVUM	30	16.9	11/1 -4/1	507

TEMPORARY SEED MIX (SUMMER):

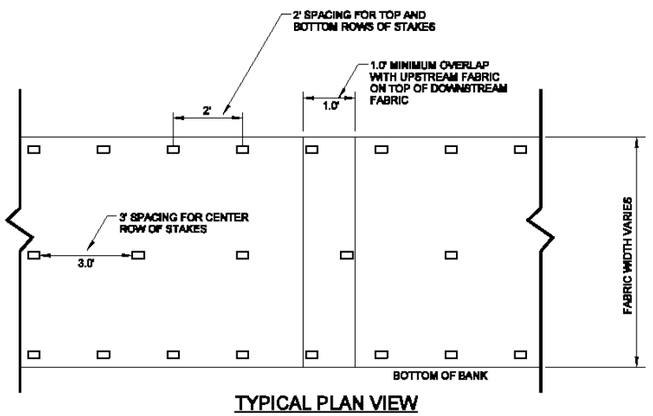
COMMON NAME	SCIENTIFIC NAME	PLANTING RATE PER ACRE (LBS)	AREA (ACRES)	TIME PERIOD	TOTAL (LBS)
FOXTAIL BRISTLEGRASS	SETARIA ITALICA	10	16.9	4/1 - 11/1	169
BROWNTOP MILLET	UROCHLOA RAMOSA	10	16.9	4/1 - 11/1	169



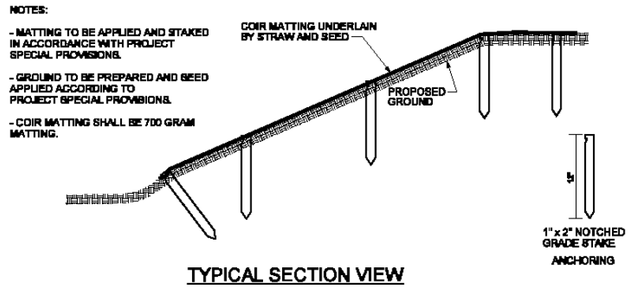
SEQUENCE OF DEWATERING OPERATIONS

1. INSTALL SPECIAL STILLING BASIN(S).
2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
3. PLACE UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. PLACE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA. AREA TO BE DEWATERED SHALL BE EQUAL TO ONE DAY'S WORK.
5. PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLANS.
6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE (DOWNSTREAM IMPERVIOUS DIKES FIRST).
7. ALL GRADING AND STABILIZATION MUST BE COMPLETED IN ONE DAY WITHIN THE PUMP-AROUND AREAS BETWEEN THE IMPERVIOUS DIKES. THE IMPERVIOUS DIKE LOCATIONS AS SHOWN ON THIS SHEET ONLY SHOW THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKE(S) FOR EACH DAY'S WORK.
8. REMOVE SPECIAL STILLING BASIN(S) AND STABILIZE DISTURBED AREA WITH SEED AND MULCH.

EXAMPLE OF PUMP-AROUND OPERATION



TYPICAL PLAN VIEW



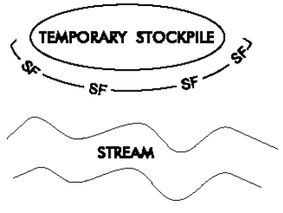
TYPICAL SECTION VIEW

COIR MATTING
SCALE: NTS

ADDITIONAL NOTES:

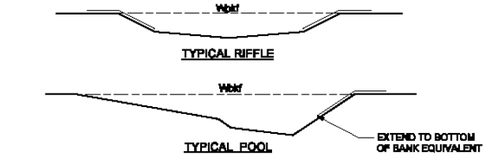
- ALL DISTURBED AREAS MUST BE SEEDED AND MULCHED IN ACCORDANCE WITH THE SPECIAL PROVISIONS.

- ALL TEMPORARY STOCKPILES SHALL HAVE SILT FENCE INSTALLED ON THE DOWN GRADIENT SIDE OF THE STOCKPILE, AS SHOWN IN THE TYPICAL DETAIL BELOW.



TEMPORARY STOCKPILE

EXAMPLE COIR MATTING PLACEMENT



NOTE: MATTING SHALL BE INSTALLED PRIOR TO THE INTRODUCTION OF WATER INTO A STREAM SECTION.

- - - BANKFULL WATER SURFACE
——— GROUND SURFACE
——— COIR MATTING

REVISIONS

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TENNESSEE STREAM MITIGATION PROGRAM

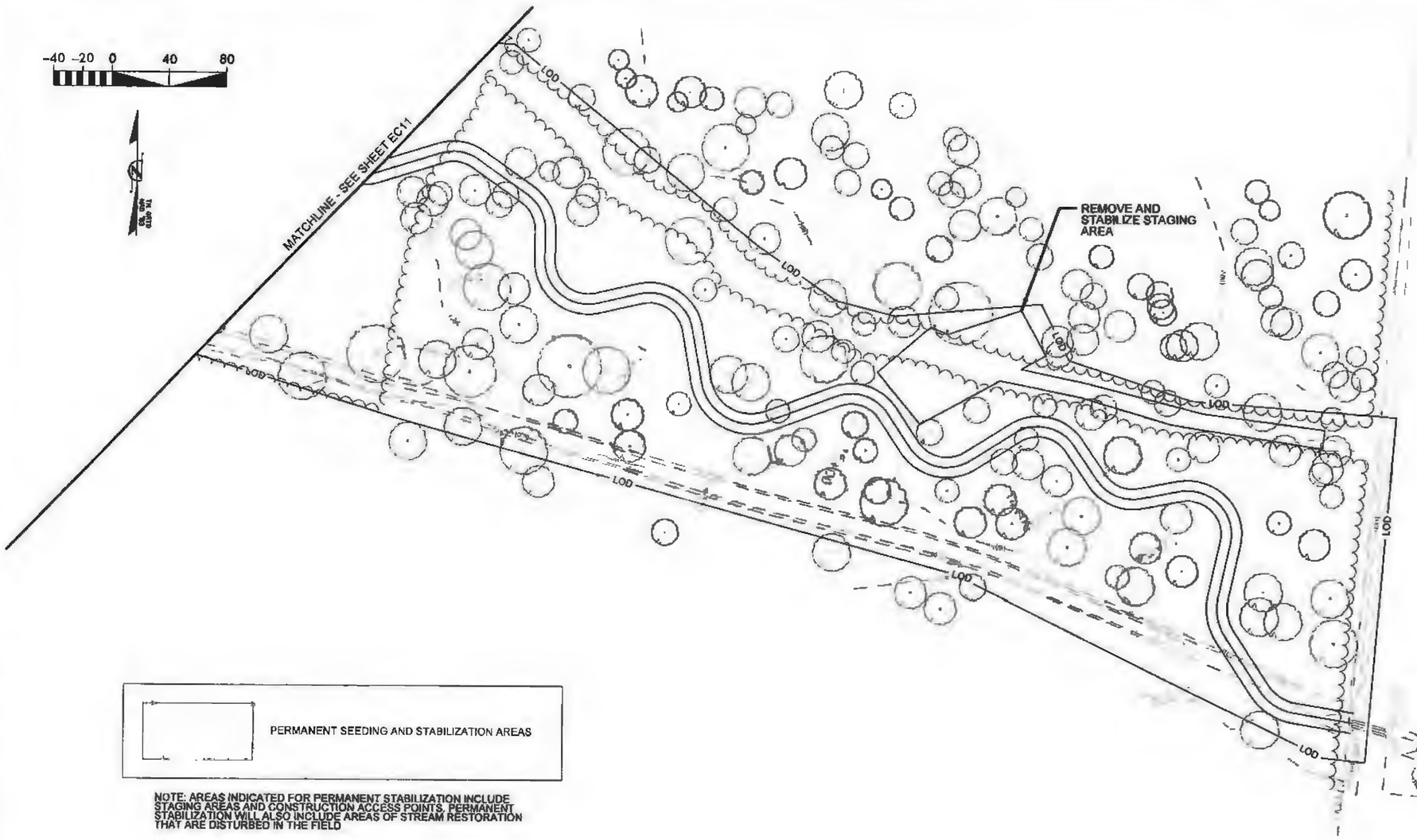
KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE

DATE: JUNE 2013
SCALE: NOT TO SCALE

INTERIM CONSTRUCTION EROSION CONTROL

SHEET EC09 OF EC14



PERMANENT SEEDING AND STABILIZATION AREAS

NOTE: AREAS INDICATED FOR PERMANENT STABILIZATION INCLUDE STAGING AREAS AND CONSTRUCTION ACCESS POINTS. PERMANENT STABILIZATION WILL ALSO INCLUDE AREAS OF STREAM RESTORATION THAT ARE DISTURBED IN THE FIELD

FINAL STABILIZATION EROSION CONTROL PLAN

ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 14 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION

THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING THE SEQUENCE OF CONSTRUCTION IN ACCORDANCE WITH THE PLANS AND THE FOLLOWING PROVISIONS, AS DIRECTED BY THE ENGINEER

SEQUENCE OF CONSTRUCTION FOR FINAL PROJECT COMPLETION

A RIPARIAN BUFFER PLANTING
1 PREPARE AND PLANT BANK AND RIPARIAN VEGETATION IN ACCORDANCE WITH PLANTING PLAN SHEETS AND AS DIRECTED BY THE ENGINEER. WOODY PLANTS MUST BE PLANTED DURING THE DORMANT SEASON (NOVEMBER - MARCH).

B FINAL COMPLETION OF PROJECT SITE
1 REMOVE ALL REMAINING WASTE MATERIALS AND RESTORE THE REMAINING STAGING AND ACCESS AREAS TO THEIR PRIOR CONDITION. SEED AND MULCH ALL DISTURBED AREAS UTILIZING THE SEED/MULCH MIXES SPECIFIED IN THE PLANS. PREPARE PROJECT RED-LINE DRAWINGS FOLLOWING THE FINAL INSPECTION

PERMANENT SEED MIX:

COMMON NAME	SCIENTIFIC NAME	PLANTING RATE PER ACRE (LBS)	AREA (ACRES)	TOTAL LBS
SWITCHGRASS	PANICUM VIRGATUM	10	16.9	169
RIVERBANK WILD RYE	ELYMUS RIPARIUS	10	16.9	169
REDTOP	AGROSTIS GIGANTEA	6	16.9	102
EASTERN GAMMA GRASS	TRIPSACUM DACTYLIDES	5	16.9	85
DEER TONGUE	PANICUM CLANDESTINUM	2	16.9	34
SHOWY TICKSEED	BIDENS ARISTOSA	2	16.9	34
NARROW-LEAF COREOPSIS	COREOPSIS LANCEOLATA	2	16.9	34
FOX SEDGE	CAREX VULPINOIDEA	2	16.9	34
RIVER OATS	CHASMANTHIUM LATIFOLIUM	1	16.9	17
			TOTAL	678

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TENNESSEE STREAM TSMP MITIGATION PROGRAM

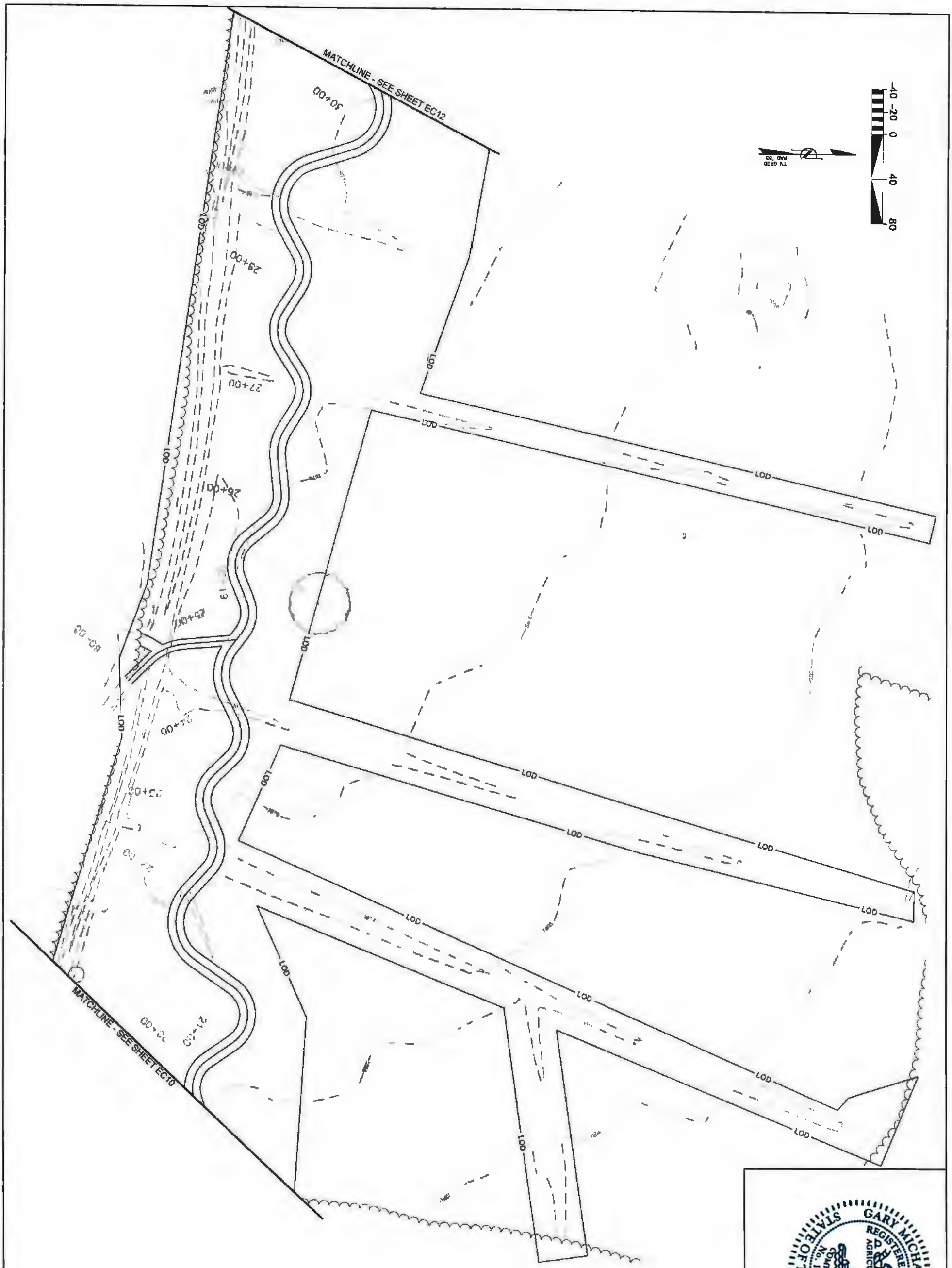
KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 10+00 - 19+73

DATE: JUNE 2013
SCALE: GRAPHIC

FINAL STABILIZATION EROSION CONTROL

SHEET EC10 OF EC14



FINAL
STABILIZATION
EROSION
CONTROL

SHEET EC11 OF EC14

DATE: JUNE 2013

SCALE: GRAPHIC

MAY PRAIRIE
STREAM RESTORATION PROJECT

COFFEE COUNTY, TENNESSEE

STATION 19+73 - 30+40

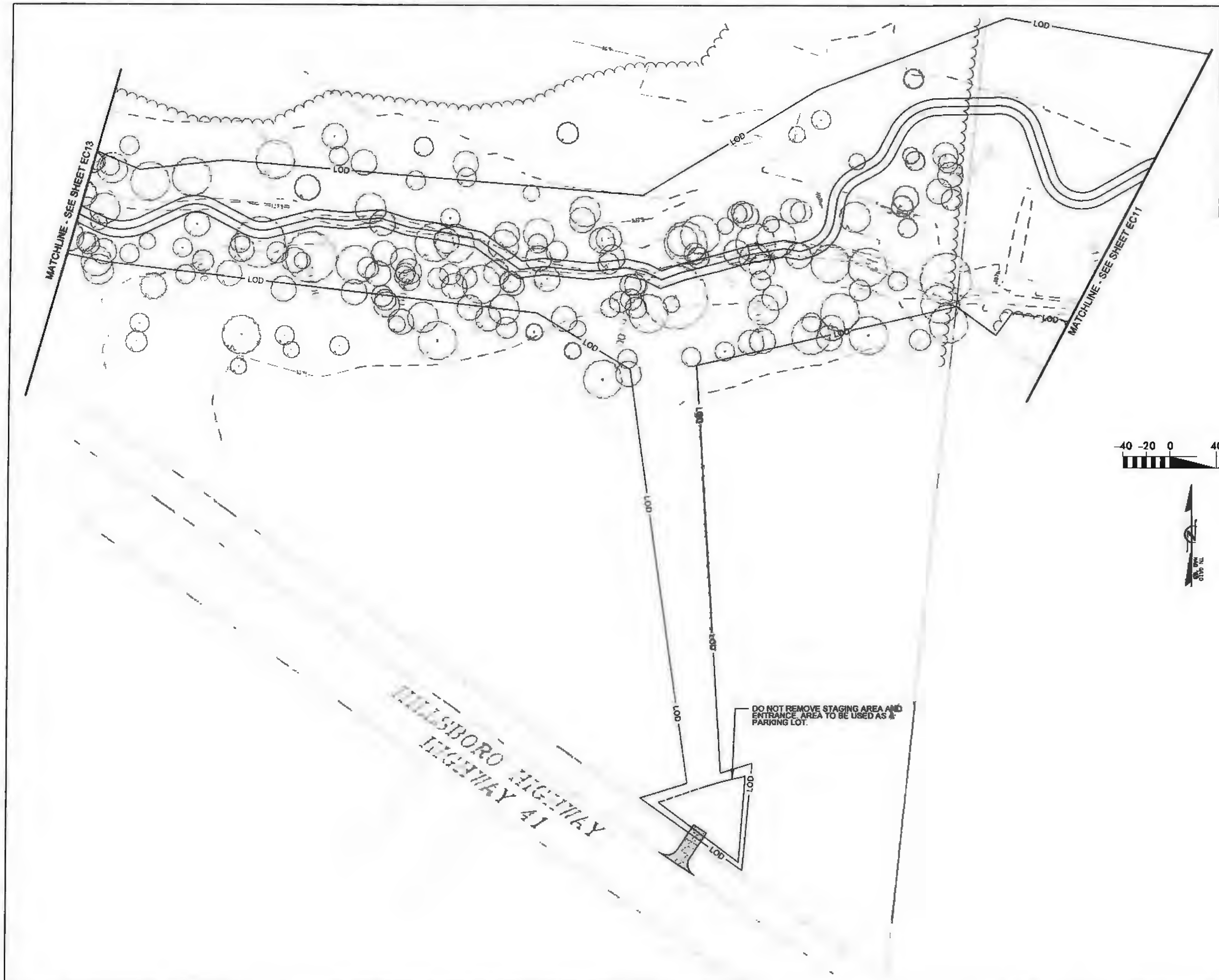
KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

TENNESSEE STREAM TSMP MITIGATION PROGRAM

BY:	DESCRIPTION	DATE	APPROVED

REVISIONS

STATE OF TENNESSEE
GARY MICHAEL MARYNCZA
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 111554



GARY MICHAEL MRYNCZA
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STATE OF TENNESSEE

REVISIONS	DESCRIPTION	DATE	APPROVED

TENNESSEE STREAM TSMP MITIGATION PROGRAM

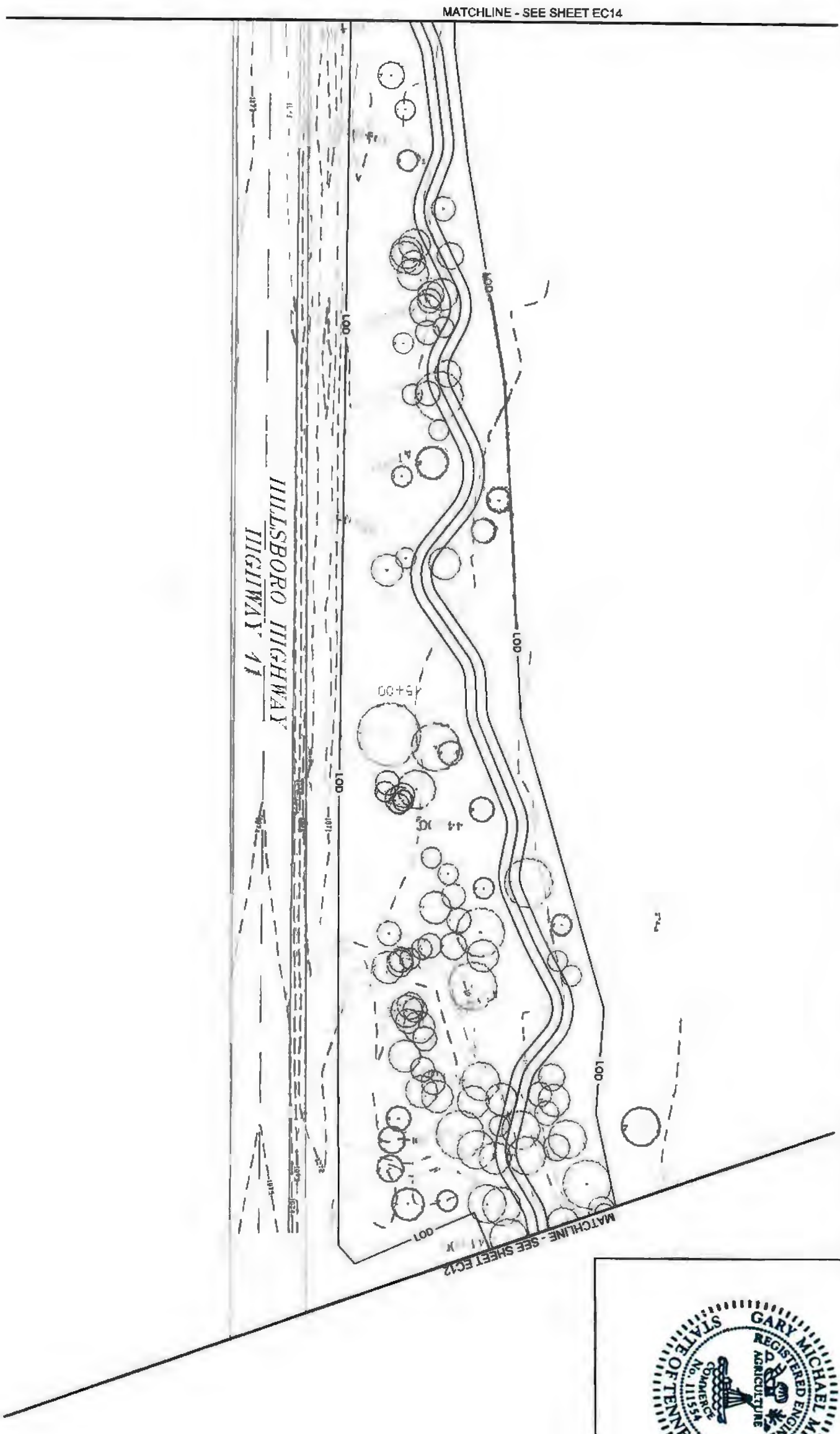
KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

MAY PRAIRIE
STREAM RESTORATION PROJECT
COFFEE COUNTY, TENNESSEE
STATION 30+40 - 41+00

DATE: JUNE 2013
SCALE: GRAPHIC

FINAL
STABILIZATION
EROSION
CONTROL

SHEET EC12 OF EC14



STATE OF TENNESSEE
GARY MICHAEL MARVENCZA
REGISTERED ENGINEER
No. 111554
COMMERCE
AGRICULTURE

FINAL
STABILIZATION
EROSION
CONTROL

SHEET EC13 OF EC14

DATE: JUNE 2013
SCALE: GRAPHIC

MAY PRAIRIE
STREAM RESTORATION PROJECT

COFFEE COUNTY, TENNESSEE

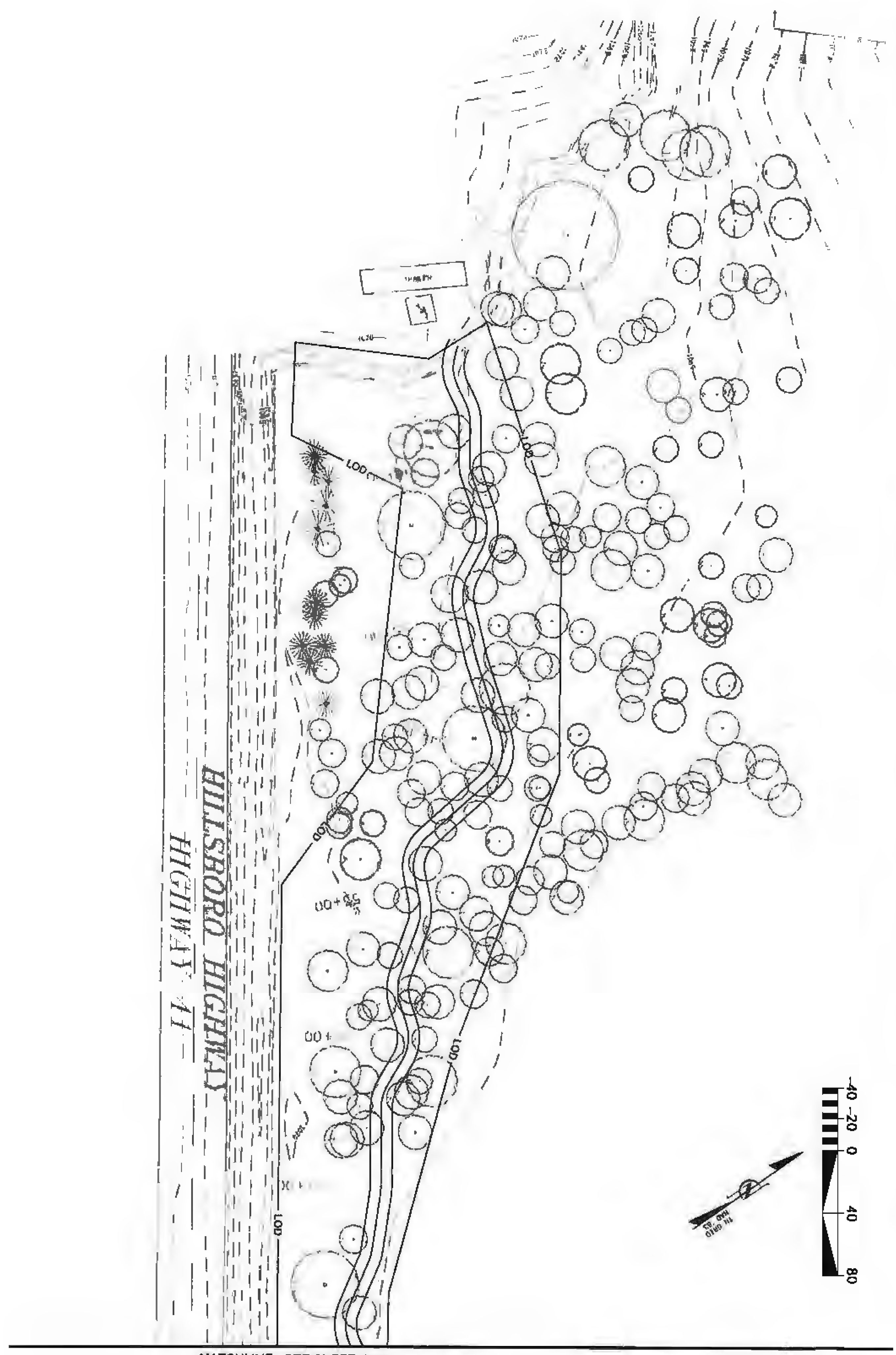
STATION 41+00 - 49+93

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

TENNESSEE STREAM TSMP MITIGATION PROGRAM

NO.	DESCRIPTION	DATE	APPROVED

REVISIONS



MATCHLINE - SEE SHEET EC13

MAY PRAIRIE
STREAM RESTORATION PROJECT

COFFEE COUNTY, TENNESSEE

STATION 49+93 - 56+80

FINAL STABILIZATION EROSION CONTROL

SHEET EC14 OF EC14

DATE: JUNE 2013
SCALE: GRAPHIC

KCI TECHNOLOGIES
7003 CHADWICK DRIVE, SUITE 343
BRENTWOOD, TN 37027

TENNESSEE STREAM MITIGATION PROGRAM

SYM	DESCRIPTION	DATE	APPROVED

REVISIONS

Appendix L
Technical Specifications

MAY PRAIRIE STREAM RESTORATION PROJECT

TECHNICAL SPECIFICATIONS AND SPECIAL PROVISIONS
COFFEE COUNTY, TENNESSEE
TSMP PROJECT 02-004-04

Prepared for the Tennessee Stream Mitigation Program
Chris Crockett, Project Manager
chris.crockett@tsmp.us

Prepared by KCI Technologies, Inc.
7003 Chadwick Drive, Suite 343
Brentwood, Tennessee 37027
www.kci.com

June 2013

MAY PRAIRIE RESTORATION PROJECT
TECHNICAL SPECIFICATIONS AND SPECIAL PROVISIONS
June 2013

Section 1.0 Site Preparation

General: Furnish all labor, equipment and materials required to complete all work associated with general access to the site, preparing the site (by removing trees in areas around the existing and proposed channel and areas where equipment will need to gain access to perform stream grading and install in-stream structures).

All work under this section shall be performed in a manner to minimize soil erosion. The Contractor shall perform such erosion control work, temporary or permanent, in order to satisfactorily minimize erosion resulting from clearing, tree removal, and site preparation. The installation of temporary or permanent erosion control measures shall begin prior to the initiation of clearing or land disturbing activities.

1.1 Construction Survey/Stake-out

Scope/Description:
Survey shall include but not be limited to all construction layouts, surveying, stakeout, and engineering necessary for the proper control of construction operations in accordance with the plans and as directed by the Engineer.

Provided Information:

Proposed Stream Layout
Information sufficient to layout the proposed stream has been included on the stream plan sheets. Grade stakes shall be set at each of the thalweg coordinates, as well as the offsets, and the stream shall be constructed in accordance with the geometry, the profile (stationed along the thalweg), and the typical cross-sections provided in the plans.

Layout of Conservation Easement
The contractor shall layout the exact location of the conservation easement on the subject property with the coordinates provided in the plans.

As-Built Conditions
The Engineer shall prepare a set of red-lined modifications superimposed on the plan view drawings. No formal as-built topographic survey will be performed by the Engineer or the Contractor unless otherwise directed by the TSMP.

1.2 Stabilized Construction Entrance

Scope/Description:
The work covered by this section consists of furnishing, installing, maintaining and removing any and all material required for the construction of a Stabilized Construction Entrance. A Stabilized Construction Entrance and Culvert installation will be utilized as it appears in the Tennessee Erosion & Sediment Control Handbook, and the English Standard Drawings by the Tennessee Department of Transportation Design Division, which are applicable to this project and by reference considered a part of these plans.

1.3 Mobilization/Demobilization

Scope/Description:
Mobilization consists of preparatory work and operations, including but not limited to the movement of personnel, equipment, supplies, and incidentals to the project site, for the establishment of facilities necessary to work on the project; the removal and disbandment of those personnel, equipment, supplies, incidentals, or other facilities that were established for the prosecution of work on the project; and for all other work and operations that must be performed for costs incurred prior to beginning work on the various items on the project site.

1.4 Staging Areas

Scope/Description:
To limit disturbance of soils on site, the Contractor shall restrict the storage and refueling of all construction equipment to the identified staging areas shown on the plans. Prior to construction activities, the Contractor shall identify and mark the boundaries of all staging areas by using silt fencing, as directed by the Engineer, and culvert installation for drainage if necessary. The upper 6" of top soil will be removed during installation and stockpiled for return to the staging area once construction is complete. If site conditions warrant, the staging area will be stabilized with a 6" rock pad of surge stone underlain by filter fabric.

Materials:
Stone materials utilized to construct the rock pad for the staging area shall be "surge stone," typically a 3"-4" machined rock.

Culvert utilized to construct positive drainage for the staging area shall be concrete, corrugated metal pipe, or dual walled plastic pipe specified by the Tennessee Department of Transportation.

The filter fabric shall be Geotextile Fabric (Type III) (Erosion Control) as specified by the Tennessee Department of Transportation.

1.6 Clearing and Grubbing

Scope/Description:
Clearing and grubbing operations shall be performed within the Limits of Disturbance as indicated on the Erosion Control plan sheets, and as directed by the Engineer and these provisions.

Following site layout and prior to the commencement of any work, the Contractor and the Engineer shall visit the site to review the boundaries of the Limits of Disturbance, sensitive areas, identify wooded areas to protect within the Limits of Disturbance and discuss site work and site access strategies that will minimize tree removal without significantly interfering with site work.

1.7 Debris Removal/On-Road Hauling

Scope/Description:
Debris removal and on-road hauling operations shall be performed within the Limits of Disturbance as indicated on the Erosion Control plan sheets, and as directed by the Engineer and these provisions.

Following site layout and prior to the commencement of any work, the Contractor and the Engineer shall visit the site to review the boundaries of the Limits of Disturbance, sensitive areas, identify wooded areas to protect within the Limits of Disturbance and discuss site work and site access

strategies that will minimize debris removal without significantly interfering with site work. Debris removed and deemed not appropriate for use on the project shall be disposed of offsite in a lawful manner. Hardwood trees satisfactory in size will be reused onsite in the designed structures. Any trees selected for removal will be clearly marked prior to the beginning of construction and all others will be protected in place.

Section 2.0 Earthwork

General: Furnish all labor, equipment and materials required to complete all work associated with channel excavation and bank/bar shaping, floodplain and valley grading, and filling and grading of the old channel.

2.1 Grading

Scope/Description:
The Contractor shall perform grading as necessary to attain final surface elevations as directed by the "Details: Stream Restoration," "Details: Typical Cross-Sections", and "Plan and Profile" sheets. The Contractor shall perform grading per the stream profile, typical cross-sections, and plan sheet notes. Any field modifications shall be approved by the Engineer. All grade changes within the active channel should have smooth transitions between sections. Excess material shall be removed from the work area and disposed of by the contractor at a pre-determined location.

Stream Excavation/Channel Filling
Excavated material from the stream channel shall be stockpiled in an agreed upon area between the Contractor and Engineer, within the project Limits of Disturbance. The Contractor should note that the placement of stockpiled material within the Limits of Disturbance may be constrained by protected areas as well as access routes. Some excavated material may be used within the stream channel to seed the new bed and backfill large eroded sections, and as a component of proposed in-stream structures as approved by the Engineer. Excess material shall be removed and disposed of by the Contractor as specified on the plans (in conjunction with the restoration work) or offsite if deemed necessary and as directed by the Engineer.

Floodplain Excavation/Grading
Excavated material from the floodplain shall be stockpiled in an agreed upon area between the Contractor and Engineer, within the project Limits of Disturbance. The contractor should note that the placement of stockpiled material within the Limits of Disturbance may be constrained by protected areas as well as access routes. Some excavated material may be used in other areas within the floodplain if an area does not meet the designed profile as directed on the "Plan and Profile" sheets. Excess material shall be removed and disposed of by the Contractor as specified on the plans (in conjunction with the restoration work) or offsite if deemed necessary and as directed by the Engineer.

2.2 Berm Installation/Isolated Stream Fill

Scope/Description:
The work covered by this section consists of the installation of a berm located along a roadside ditch and the backfilling of the original stream channel in the lower wooded portion of the project. The berm installation and isolated stream fill will be created by the use of topsoil excavated onsite within the project Limits of Disturbance.

Materials:
Topsoil excavated from multiple locations within the project Limits of Disturbance and as directed by the Engineer will be used in both the berm installation and isolated stream fill.

If necessary, offsite fill or topsoil may be used upon consultation with the project owner and TDEC.

Construction Methods:
The location and dimensions of the berm will be determined by the Engineer in the field, but will generally follow the layout depicted in the plans. The topsoil will be placed and machine compacted in the specified area. A combination of seed and a layer of straw will then be placed on top of the compacted topsoil berm. For ditch backfilling, excavated topsoil will be placed within the original channel beginning at the most upstream location of the stream and continuing downstream from there. The isolated stream fill will then be machine compacted and covered with a combination of seed and a layer of straw.

Section 3.0 Stream Structures

General: Furnish all labor, equipment and materials required to complete all work associated with installing in-stream structures and bank stabilization treatments. In-stream structures include Stone Toe Stabilization, Constructed Riffle, Constructed Log Riffle, Rock Ford Crossing, Channel Block, Vegetated Soil Lift, Toe Wood with Soil Lift, and Reinforced Concrete Pipe Culvert. Due to the nature of the work required, it is anticipated that the location or other aspects of in-stream structures to be constructed may change at the direction of the Engineer due to the actual conditions that occur during the construction of the project. Such variations will not be considered as alterations in the details of construction or a change in the character of the work.

3.1 Stone

Scope/Description:
The work covered in this section consists of furnishing, stockpiling, placing and maintaining approved stone to be used in constructing in-stream structures and for use in other locations as directed by the Engineer.

Materials:
Rock materials for machined rock shall consist of blasted stone or other stone approved by the Engineer. The stone shall be sound, tough, dense, resistant to the action of air and water, and suitable in all other respects for the purpose intended.

Machined rock - shall meet the state gradation specifications and/or the following requirements regarding the size distribution:

ACCEPTANCE CRITERIA FOR STONE

Type	REQUIRED STONE SIZES- (INCHES)		
	Minimum	Midrange	Maximum
Crusher Run	0"	1.5"	3"
Surge Stone	3"	3.5"	4"
Class A-3	2 (51)	4 (102)	6 (152)
Class B	3 (76)	12 (305)	27 (686)

No more than 5% of the material furnished can be less than the minimum. The size of an individual stone will be determined by measuring its diameter across any axis, and shall be satisfactory if it falls within the acceptable dimensions.

Construction Methods:
The Contractor shall place the stone in the constructed stream channels at the locations shown on the plans, to the thickness, widths, and lengths as shown on the plans, or as directed by the Engineer. All machined rock shall be placed neatly and uniformly with an even surface to form a natural-like streambed, in accordance with the details in the plans and shall meet the approval of the Engineer.

3.2 Stone Toe Stabilization

Scope/Description:
The work covered by this section consists of the construction of stone toe stabilization, a bank structure designed to protect against erosion and scour by providing a stabilizing layer of rock to armor along the lower portion of the bank.

The quantity and location of stone toe stabilization to be constructed will be in accordance with the plans but may be affected by the actual conditions that occur during the construction of the project. The quantity of Class A-3 stone for the toe stabilization may be increased, decreased, or eliminated entirely at the direction of the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials:
Class A-3 materials utilized to stabilize the toe of slopes shall meet all the requirements of Stone, Class A-3 as specified in these special provisions.

Construction Methods:
Stone toe stabilization shall be constructed in accordance with details in the plans, at locations as shown on the Plan and Profile sheets or as directed by the Engineer.

Install the fiber matting upslope of the area to be covered by stone and secure the bottom 1' of the matting behind the proposed top level of stone according to the Coir Fiber Matting specification in these special provisions. Install stone beginning at the bottom of the bank and continuing to the bankfull height or as specified by the Engineer.

3.3 Constructed Riffle

Scope/Description:
The work covered in this section consists of the construction of a constructed riffles, an in-stream structure designed to provide grade control and defined bed forms where stream conditions dictate a structural solution to maintain long term longitudinal integrity. The quantity and location of the constructed riffles to be constructed will be in accordance with the plans but may be affected by the actual conditions that occur during the construction of the project. Such variations will not be considered as alterations in the details of construction of a change in the character of the work.

Materials:
Stone materials utilized to constructed riffles shall meet all the requirements to Class A-3 Stone. Existing channel substrate will be utilized to establish a consolidated, but sorted bed surface.

Construction Methods:
Constructed riffles shall be constructed in accordance with details (including notes) in the plans, at locations as shown on the Plan and Profile sheets or as directed by the Engineer.

3.4 Constructed Log Riffle

Scope/Description:
The work covered in this section consists of the construction of a constructed log riffle, an in-stream structure designed to provide grade control and defined bed forms in over steep reaches, transitional zones, and in areas where stream conditions dictate a structural solution to maintain long term longitudinal integrity. The quantity and location of the constructed log riffles to be constructed will be in accordance with the plans but may be affected by the actual conditions that occur during the construction of the project. Such variations will not be considered as alterations in the details of construction of a change in the character of the work.

Materials:
Stone materials utilized to construct riffle step grade controls shall meet all the requirements to Class A-3 and B Stone, and 10" diameter logs, or larger. Existing channel substrate will be utilized to establish a consolidated but sorted bed surface.

Construction Methods:
Constructed log riffles shall be constructed in accordance with details (including notes) in the plans, at locations as shown on the Plan and Profile sheets or as directed by the Engineer. Logs of at least 10" diameter will be used make alternating sills and may be replaced by Class B sills based on the site conditions and Engineer recommendations.

3.5 Rock Ford Crossing

Scope/Description:
The work covered by this section consists of the construction of rock fords placed in the restored channels for passage. These fords allow for permanent, stabilized crossings through the stream that will not negatively affect the form or function of the stream.

The quantity and location of the fords to be constructed will be in accordance with plans, but may be affected by the actual conditions that occur during the construction of the project. Such variations will not be considered as alteration in the details of construction or a change in the character of the work.

Materials:
Stone materials utilized to construct fords shall meet all the requirements of Class A-3 Stone and will also rely on the use of channel material from excavation of the existing stream.

The filter fabric shall be Geotextile Fabric (Type III) (Erosion Control) as specified by the Tennessee Department of Transportation.

Construction Methods:
Rock fords shall be constructed in accordance with details in the plans, at locations as shown on the Plan and Profile sheets or as directed by the Engineer.

A stream section as wide as indicated in the plan sheets will be graded to gently slope from the thalweg of the cross section to the channel banks and sloping up the elevation of the surrounding

terrain; this slope shall not exceed a slope of 5:1. The ford section shall be minimally graded to maintain a cross-section similar to the typical cross-sections. Filter fabric shall cover the graded section of the ford and be installed under the above described ford materials.

3.6 Channel Block

Scope/Description:
The work covered by this section consists of the construction of and maintenance of physical barriers placed in abandoned channel segments to prevent future stream avulsions.

The quantity of the channel blocks to be constructed will be affected by the actual conditions that occur during the construction of the project. The quantity of channel blocks may be increased, decreased, or eliminated entirely at the direction of the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials:
Stone materials utilized to construct the channel blocks shall meet all the requirements of Class A-3 Riprap, and will also include the use of channel material and surge stone. A suitable impervious select material, either onsite or from a borrow source, will be identified and evaluated by the TSMP project manager and the contractor representative, prior to incorporation into the channel block structures.

Construction Methods:
Channel blocks shall be constructed in accordance with the details on the plans, at locations as shown on the Plan and Profile sheets or as directed by the Engineer.

Clear and grub all side slopes of the abandoned channel. Place the Class A-3 Stone and channel material and/or surge stone, as approved by the Engineer and as depicted in the detail, in the abandoned channel ensuring that there is at least five feet of embankment materials between the block and the face of the restored stream bank, as well as below the proposed stream thalweg elevation. Construct the channel block across the entire width of the abandoned channel to an elevation of 0.5 feet below the proposed fill elevation as shown on the plans. Finally, compact fill on top of stone to the plan elevation.

3.7 Toe Wood with Soil Lift

Scope/Description:
The work covered by this section consists of the construction of Toe Wood with Soil Lift, a bank structure designed to stabilize eroding and scoured banks by installing natural soil material in layers wrapped with Coir Fiber Matting to provide additional stabilization on top of logs to mimic natural log jams and constructed to tie into the correct bankfull height depicted in the plans. The structure should be installed as a dynamic feature of the stream that will accumulate sediment and become vegetated with shrubs and trees.

The quantity and location of the Toe Wood with Soil Lift to be constructed will be in accordance with the plans but may be affected by the actual conditions that occur during the construction of the project. The quantity of Toe Wood with Soil Lift may be increased, decreased, or eliminated entirely at the direction of the Engineer. Such variations in quantity will not be considered as alterations in the details if the construction or a change in the character of the work.

Materials:
Individual tree trunk/root balls/branches/brush proposed for use in the revetment shall be approved by the Engineer.

The filter fabric shall be Geotextile Fabric (Type III) (Erosion Control) as specified by the Tennessee Department of Transportation.

The coir matting shall be 700gram woven coir matting.

Construction Methods:
A Toe Wood with Soil Lift revetment shall be constructed in accordance with the details in the plans, at locations as shown on the Plan and Profile sheets or as directed by the Engineer.

Excavate the bank as necessary to stabilize existing slopes for structure installation. Begin structure at the proposed bottom of bank with filter fabric. Install logs, 4" to 10" diameter, facing upstream at 30 degree angles as a base. Continue stacking tops of cross limbs with brush in multiple directions then wrap filter fabric over brush and add a layer of soil on top. Finally, install a 0.8-1.0' vegetated soil lift, wrapped in 700 gram coir matting underlain by seed and straw, to reach the proposed top of bank.

3.8 Reinforced Concrete Pipe Culvert

Scope/Description:
The work covered in this section consists of the installation of reinforced concrete pipe culverts, a structure used for conveying flow beneath a roadway or embankment. The culverts will vary in size based on location and hydrologic demand. This will be determined by the Engineer.

Materials:
Stone material utilized as bedding material to surround the reinforced concrete pipe will be Class A, typically a 2"-6" machined rock.

A 6" layer of clean fill dirt will be used as backfill and compacted on top of the bedding material.

A 6" layer of "crusher-run" stone, typically a 0"-1" stone, will be used as the surface material.

Construction Methods:

Multiple culverts (varying in size and type) will be installed throughout the project, all of which will be installed in the following manner. The proposed culvert location will be excavated to the length of the pipe and wide enough to permit the placement of an acceptable amount of Class A bedding material. When excavation is complete, Class A stone will be placed in the trench. The reinforced concrete pipe will then be placed at a specific slope as determined by the Engineer and then surrounded by Class A stone. A 6" layer of clean fill dirt will then be placed on top of the Class A stone and will be machine compacted. A 6" layer of "crusher run" stone will be placed as the surface material and will be machine compacted in order to achieve maximum possible density.

3.9 Plunge Pool

Scope/Description:
The work covered in this section consists of the construction of a plunge pool to dissipate the energy of water flowing out of a culvert. The size of the pool to be constructed will be in accordance with

the plans, but may be affected by the actual conditions that occur during the construction of the project. Such variations will not be considered as alteration in the details of construction or a change in the character of the work.

Materials:
Stone materials utilized to construct the plunge pool shall meet all the requirements of Class A-3 Riprap.

The filter fabric shall be Geotextile Fabric (Type III) (Erosion Control) as specified by the Tennessee Department of Transportation.

Construction Methods:
The plunge pool shall be constructed in accordance with details in the plans, at locations as shown on the plan and profile sheets or as directed by the Engineer. Clear and grub the slopes of the channel that will be disturbed by the pool. Excavate the channel to allow for a depth of 1' of Class A-3 Riprap with filter fabric underneath the rock. The slopes of the pool shall be 3:1.

Section 4.0 Erosion Control

General: Furnish all labor, equipment and materials required to complete all work associated with the installation and maintenance of temporary or permanent erosion control measures. Erosion control measures shall be installed in accordance with the plans and special provisions, the Tennessee Erosion & Sediment Control Handbook, and as directed by the Engineer.

4.1 Coir Fiber Matting (Woven)

Scope/Description:
Furnish, install and maintain coir matting in locations as directed by the Engineer. Work includes providing all materials, excavating and backfilling, and placing and securing coir matting. Preparation of soil and seeding in conformance with section 4.5 will occur prior to the placing of the matting.

Materials:
Provide matting to meet the following requirements:
100% coconut fiber (coir) twine woven into a high strength matrix
Size: 6.6 x 164 FT (120SY)
Weight: 21 oz/SY
Thickness: 0.30 in. minimum
Tensile Strength (Wet): 86/41 lbs/in. minimum
Elongation (Wet): 64% x 48%
Permissible Shear: (lbs/SF): 4.5
Flow Velocity: 10 ft/sec
"C" Factor: 0.003
Open Area (measured): 50%

Stakes:
Provide hardwood stakes minimum 1' x 1" x 2" with a 1" notch on one side 2" from the top of stake.

Construction Methods:
In locations where this and other stabilization techniques are jointly utilized, all treatments shall be installed so that they interface smoothly and provide the appropriate protection for the stream banks.

Prior to installation prepare soil as specified. Provide smooth soil surface free from stones, clods, or debris that will prevent the uniform contact of the matting with the soil. Take care to preserve the required line, grade, and cross-section of the area covered and apply the specified seed mix/mulch as indicated.

Start the installation at the upstream end of the channel by placing the matting immediately upon final graded bank surfaces. Secure the matting at the bottom and top of the bank with wooden staking. Apply the matting by unrolling from upstream to downstream, without stretching such that the matting will lie smoothly but loosely on the ground and in good contact with the soil surface, without air pockets or gaps beneath the matting. Where one roll of matting ends and a second roll begins, overlap the end of the upstream roll over the top of the beginning of the downstream roll so there is a 1-foot overlap and stake the two pieces.

Provide a final anchor trench, 12" wide by 12" deep, at the downstream limits of the application area. Stake the matting, backfill and compact. Place a row of stakes, with the stakes placed 2' apart, on the top and bottom of the strip of matting. Place stakes 3' apart down the center of each strip of matting. The Engineer may require adjustments in the trenching or staking requirements to meet individual site conditions (i.e. multiple roll thickness, trenching into undisturbed soils on an extended bank area).

4.2 Coir Fiber Matting (Nonwoven)

Scope/Description:
Furnish, install and maintain nonwoven coir matting in locations as directed by the Engineer. Work includes providing all materials, excavating and backfilling, and placing and securing nonwoven coir matting. Preparation of soil and seeding in conformance with section 4.5 will occur prior to the placing of the matting.

Materials:
100% Coconut fiber stitched with biodegradable thread between biodegradable natural fiber top and bottom nets.
Size: 6.67 x 108 FT (80SY)
Weight: 8.83 oz/SY
Thickness: 0.28 in. minimum
Tensile Strength (Wet): 141.6 lbs/in. minimum
Elongation (Wet): 14%
Permissible Shear: (lbs/SF): 2.35
Flow Velocity: 10 ft/sec
"C" Factor: 0.018
Open Area (measured): 17%

Construction Methods:
In locations where this and other stabilization techniques are jointly utilized, all treatments shall be installed so that they interface smoothly and provide the appropriate protection for the stream banks.

Prior to installation prepare soil as specified. Provide smooth soil surface free from stones, clods, or debris that will prevent the uniform contact of the matting with the soil. Take care to preserve the required line, grade, and cross-section of the area covered and apply the specified seed mix/mulch as indicated.

Start the installation at the upstream end of the channel by placing the matting immediately upon final graded bank surfaces. Secure the matting at the bottom and top of the bank with wooden staking. Apply the matting by unrolling from upstream to downstream, without stretching such that the matting will lie smoothly but loosely on the ground and in good contact with the soil surface, without air pockets or gaps beneath the matting. Where one roll of matting ends and a second roll begins, overlap the end of the upstream roll over the top of the beginning of the downstream roll so there is a 1-foot overlap and stake the two pieces.

A row of 12" eco stakes will then be placed along the perimeter of each roll of nonwoven coir matting at a maximum distance of 3'. The Engineer may require adjustments in the staking requirements to meet individual site conditions. The nonwoven coir matting will be installed so that it covers the entire cross-section (one width of matting) of the secondary channels that will be installed along Reaches 3 and 4.

4.3 Filter Fabric and Temporary Silt Fence

Scope/Description:
Use of filter fabric and temporary silt fence shall be incorporated where specified as they appear in the Tennessee Erosion & Sediment Control Handbook and the English Standard Drawings by the Tennessee Department of Transportation Design Division, which are applicable to this project and by reference, are considered a part of these plans:

4.4 Temporary Seeding

Scope/Description:
The work covered under this section shall consist of furnishing, applying and maintaining all materials necessary to conduct temporary seeding and mulching activities required to stabilize all disturbed areas as directed by the Engineer. Temporary seeding will be required on all disturbed areas within the project limits.

Materials:
The Contractor shall utilize the following seed mix in seeding all disturbed areas within the project limits:

Summer Mix (May 1 – October 14)	
Foxtail Bristlegrass (*Setaria italica*)	10 lb/acre
Browntop Millet (*Urochloa ramosa*)	10 lb/acre
Winter Mix (October 15 – April 15)	
Winter Rye (*Secale cereale*)	30 lb/acre
Winter Wheat (*Triticum aestivum*)	30 lb/acre

Construction Methods:
Seed is to be sown with a spreader or a seeding machine. Seed is to be evenly distributed and should not be broadcast or dropped when wind velocity exceeds 5 mph. Seeded areas are to be protected by spreading straw mulch uniformly to form a continuous blanket over seeded areas. The Contractor may propose alternate methods of seeding and mulching (hydro-seeding) if shown to be equivalent to the proposed method.

4.5 Permanent Seeding

Scope/Description:
The work covered under this section shall consist of furnishing, applying and maintaining all materials necessary to conduct seeding activities called for in the plans.

Materials:
The Contractor shall utilize the following seed mix specification in all areas inside the riparian buffer zones, including the stream banks:

		Application Rate (in Mix)	
Species		% of Mix	lb/acre
Switchgrass	*Panicum virgatum*	25	10.0
Riverbank Wild Rye	*Elymus riparius*	25	10.0
Redtop	*Agrostis gigantea*	15	6.0
Eastern gamma grass	*Tripsacum dactylides*	12.5	5.0
Deer Tongue	*Panicum clandestinum*	5	2.0
Showy Tickseed	*Bidens aristosa*	5	2.0
Narrow-Leaf Coreopsis	*Coreopsis lanceolata*	5	2.0
Fox Sedge	*Carex vulpinoidea*	5	2.0
River Oats	*Chasmanthium latifolia*	2.5	1.0
	TOTALS	**100**	**40.0**

Construction Methods:
Seed is to be sown with a spreader. Seed is to be evenly distributed and should not be broadcast or dropped when wind velocity exceeds 5 mph. Seeded areas shall be protected by spreading straw mulch uniformly to form a continuous blanket over seeded areas. The Contractor may propose alternate methods of seeding and mulching (hydro-seeding) if shown to be equivalent to the proposed method.

The contractor shall combine the permanent seed mix and both temporary seed species into one mix and apply on all areas within the conservation easement.

4.6 Straw Mulching

Scope/Description:
The work covered under this section shall consist of furnishing, applying and maintaining all materials necessary to conduct mulching activities called for in the plans.

Materials:
All straw used for mulching activities will be large, round bales that have previously been harvested and stored onsite. These bales contain species that currently exist at the project location in order to prevent the introduction of other plant species and/or invasive species.

Construction Methods:
The round bales will be rolled out and hand spread uniformly in order to create a continuous blanket over seeded areas. The Contractor may propose alternate methods of mulching if shown to be equivalent to the proposed method.

4.7 Pump-Around/Dewatering

Scope/Description:
The work covered under this section consists of the diversion of water around a section of active channel work to prevent sediment from entering the stream and facilitate the construction of the channel.

Materials:
The contractor shall provide the following materials:

Pump
Flexible Hoses (long enough to completely divert the water around the construction)
Special Stilling Basin
Dewatering Pump
Impervious Dikes (both upstream and downstream of the construction)
Rock Pad to act as a Stabilized Outlet for the Discharge of Clean Water

Construction Methods:
The pump-around/dewatering operation shall follow the details on the interim construction erosion control sheet or as directed by the Engineer.

Section 5.0 Planting

General: The design representative or TSMP Project Manager will be on-site during all activities involving permanent planting, including but not limited to the following: site preparation for planting, exotic plant removal, seedling handling and storage, planting operations, quality control inspections, and managing plant competition.

All riparian plantings should include preparation of the planting bed as necessary to relieve compaction. The planting contractor shall warrant an 80% survival rate against defects including mortality and poor growth, except for defects resulting from abuse by other parties and abnormal weather conditions. A vegetation specialist will develop a remedial planting plan, if necessary, based upon the first-year monitoring report. The remedial planting plan will be implemented by the planting contractor. The remedial planting plan should include the components of site preparation, competition control and re-planting.

5.1 Live Stakes

Scope/Description:
The work covered by this section consists of furnishing, transporting, installing, and maintaining live Work includes providing all materials necessary to install the live stake cuttings.

Materials:
Live stake plant material shall be composed of freshly cut, dormant branches consisting of a random mix made up of native species as listed in the planting plan. Species composition may not be modified without the prior approval of the Engineer. Live stakes shall be ½" – 2" in diameter and 1.5-2' in length.

Construction Methods:
Prior to the start of work in this item, the Contractor shall submit a proposed harvest/procurement and installation schedule, including source of supply of live cuttings, to the Engineer for review. No work shall be performed until the Engineer approves this schedule.

Procurement: Live staking materials may either be harvested locally by the contractor or procured from a certified nursery specializing in the production of bioengineering plant materials.

If harvesting bioengineering plant materials from existing native or naturalized stands, the source of all live cuttings shall be located on-site, within practical hauling distance of the site, and/or within the same physiographic ecoregion and plant hardiness zone as the site. For harvest sites located on the properties not owned by the Contractor, the contractor shall provide TSMP with written permission from the property owner to harvest materials on their property.

In lieu of harvesting the plant materials, the cuttings may be obtained from a local certified nursery that specializes in the production of bioengineering plant materials. The Engineer must approve the source of supply of live cuttings. Live stakes obtained from the nursery must meet the same physiographic ecoregion and plant hardiness zone requirements as harvested stakes, and must be protected during shipping as detailed below.

Handling during harvest/transport: The Contractor shall be responsible for harvesting and transporting the cuttings to the job site. Live cuttings shall be bundled together securely at the collection site for easy loading, handling, and protection during transport. If transport by vehicles is necessary, the bundles shall be covered with tarpaulin, transported in unheated vehicles, and moistened to prevent drying-out and additional stress. Live cuttings shall be transported to the construction site within 24 hours of harvest and shall be installed within 48 hours of cutting (especially if the ambient temperature is 50°F or above).

Storage: If the cuttings are not installed immediately following harvesting or shipping, they shall be promptly and properly places in controlled storage conditions and protected until installation is possible. During storage, live stakes must be protected against drying out and overheating (e.g., by storing in controlled conditions, storing in shade, covering with watered-down burlap, coir fiber matting or straw, placing in moist soil, or spraying with anti-transpirant chemicals). Regardless of the storage method utilized, live stakes shall receive continuous shade, shall be sheltered from the wind, and shall be continuously protected from drying-out. If storage is required, live branch cuttings shall be stored for a period of no longer than (3) days. The Engineer must approve any storage of live branch cuttings.

Stake Preparation: Side branches and brushy limbs shall be cleanly removed and the bark of the stake must remain intact. Buds on the stakes shall be oriented towards the top of the stake. Live stakes shall be cut to size as specified above. All cuts shall be smooth and the cut surface shall be kept as small as possible. The cut on the bottom end of the stake shall be angled to 30 to 45 degrees for easy insertion into the soil. The cut on the top end of the stake shall be at a 90-Degree angle to the stake to ensure a flat surface for hammering into the slope. The use or large pruning shears may be required with larger branches.

Stake Installation: Prior to installation, the Contractor is required to obtain the Engineer's approval of all plant materials intended for use. Live stakes shall be spaced approximately three (3) feet on center and should be installed in accordance with the details provided in the plans. Buds of the stakes shall be oriented upward during staking. Live stakes shall be tamped perpendicularly into the ground, using a dead blow hammer or rubber mallet. A minimum of 2/3 of the length of the live stake shall be installed into the ground. The area around each live stake shall be compacted by foot after the live stake has been installed. Stakes that split during installation shall be promptly removed and replaced. Following installation, the top 1"-2" of each live stake shall be cut cleanly off (with loppers) at an angle of approximately 15 degrees.

5.2 Riparian Plantings (Bare Root)

Scope/Description:
The work covered by this section consists of furnishing, installing and maintaining vegetation at locations described on the plans or in locations as directed by the design representative/TSMP Project Manager in accordance with these specifications. The work of planting includes planting bed preparation, initial planting, plant establishment, and replacement planting.

Materials:
Tree and shrub plantings will consist of the species, in the quantities and sizes, as stipulated on the planting plan sheets. All plant material shall meet appropriate physiographic ecoregion and plant hardiness zone requirements, and be from an approved source.

The planting season for bare root seedlings is between November 15 and April 1. All bare root seedlings should have average heights between 18-24 inches and be from premium stock. Hard-mast producing oak/hickory seedlings should have a minimum root collar diameter (RCD) of 3/8-inch caliper. Hard-mast tree seedlings with less than 3/8 inch caliper will be culled from planting. Seedlings should have relatively few lateral branches, but possess a well-established rooting system.

Construction Methods:
Trees and shrubs shall be planted in the riparian buffer zone depicted on the plan sheets and in accordance with the details in the plans, as directed by the Planting Plan Designer.

No planting shall be done when the temperature is below 32°F, when soil to be excavated for the plant hole is frozen, when the sides or bottom of the plant hole are frozen, or when the soil to be used for backfilling is frozen or to wet. In digging, loading, transporting, unloading, planting, or otherwise handling plants, the Contractor shall exercise utmost care and use adequate precautions to prevent injury to or drying out of the trunk, branches, or roots as well as prevent freezing of the plant roots. Container vegetation must always be handled by the container and never by the tops of the plants.

Installation of the vegetation shall be located in designated areas as described in the plans and as directed by the Engineer. Soil in the area of planting shall be loosened to a depth no less than the depth of the root. Vegetation will be planted in holes made by a shovel or other means that meet the approval of the Planting Plan Designer. The planting trench or hole shall be deep and wide enough to permit roots to spread out and down without J-Rooting.

Care should be taken to ensure seedling root systems are always kept moist and covered from the elements. Root and branch pruning should take place immediately before seedling installation. Enough of the root system should be pruned to encourage new root growth and fit into the excavated hole without j-rooting. However, the majority of the system should remain to provide nourishment and energy for plant growth. After planting, the soil shall be tamped firmly to eliminate pockets.

5.3 Invasive Species Control

Scope/Description:
To prevent the introduction of invasive species to the construction site, all construction equipment shall be sanitized before entering the jobsite, and if construction equipment is not sanitized upon mobilization to the jobsite the construction equipment will need to be pressure washed at the staging entrance of the jobsite. This includes any vehicles that come on to the job site and will proceed past the staging area.

Appendix M
Performance Standards

PROJECT PERFORMANCE STANDARDS

Project Name: May Prairie Stream Restoration Project
TSMP Project No.: 02-004-04
Stream Name: UT to Hunt Creek
Stream Reach: A

Habitat Assessment Criteria		**Pre-project RBP Score**	**Median Ecoregion Reference Score**	**Target RBP score at end of monitoring period[1]**
RBP Habitat Assessment Score		95	140	105
Morphology Criteria			**Design Value or Value Range[2]**	**Target value range (min./max.)**
Riffle	Bankfull Cross-sectional Area (A_{bkf})		11.0	8.8-13.2
	Bankfull Width (W_{bkf})		14.0	11.2-16.8
	Bankfull Mean Depth (d_{bkf})		0.8	0.6-1.0
	Width/Depth Ratio		17.5	11.0-28.0
	Entrenchment Ratio		>2.2	>2.2
Pool	Bankfull Cross-sectional Area (A_{bkf})		34.5	24.0-45.0
	Bankfull Width (W_{bkf})		17.0	13.0-21.0
	Max. Depth (D_{max})		3.0	1.5-4.0
Stability Criteria		**Stream Type**	**Pre-project Rating/Condition**	**Monitored Condition**
Channel Stability Evaluation Rating		C 6	Good-Fair	"Good" during every monitored year
Hydrology Criteria				**Bankfull Flow Occurrence**
Bankfull Stage				Bankfull event occurs in minimum of 2 of the 5 years monitored[3]

1. Greater than 75% of median ecoregion reference score.
2. To be replaced with actual as-built values or range upon completion of baseline monitoring.
3. Given normal precipitation patterns during the monitoring period.

PROJECT PERFORMANCE STANDARDS

Project Name: May Prairie Stream Restoration Project **TSMP Project No.:** 02-004-04
Stream Name: UT to Hunt Creek **Stream Reach:** B

Habitat Assessment Criteria		**Pre-project RBP Score**	**Median Ecoregion Reference Score**	**Target RBP score at end of monitoring period[1]**
RBP Habitat Assessment Score		95	140	105
Vegetation Criteria			**Design Value**	**Target value at end of monitoring period**
% Bare Ground			<10%	<10%
Morphology Criteria			**Design Value or Value Range[2]**	**Target value range (min./max.)**
Riffle	Bankfull Cross-sectional Area (A_{bkf})		9.0	7.0-11.0
	Bankfull Width (W_{bkf})		13.0	10.0-16.0
	Bankfull Mean Depth (d_{bkf})		0.7	0.5-0.9
	Width/Depth Ratio		18.8	10.0-26.7
	Entrenchment Ratio		>2.2	>2.2
Pool	Bankfull Cross-sectional Area (A_{bkf})		34.5	24.0-45.0
	Bankfull Width (W_{bkf})		17.0	13.0-21.0
	Max. Depth (D_{max})		3.0	1.5-4.0
Profile	Avg. WS Slope		0.0027	0.0020-0.0034
	Ratio: Riffle Slope/Avg. WS slope		1.9-5.6	1.5-6.0
	Ratio: Pool Slope/Avg. WS slope		0.0-0.2	0.0-0.3
	Ratio: Pool-pool Spacing/Bankfull Width (W_{bkf})		4.2-7.3	3.4-8.8
Stability Criteria		**Stream Type**	**Pre-project Rating/Condition**	**Monitored Condition**
Channel Stability Evaluation Rating		C 6	Good-Fair	"Good" during every monitored year
Hydrology Criteria				**Bankfull Flow Occurrence**
Bankfull Stage				Bankfull event occurs in minimum of 2 of the 5 years monitored[3]

1. Greater than 75% of median ecoregion reference score.
2. To be replaced with actual as-built values or range upon completion of baseline monitoring.
3. Given normal precipitation patterns during the monitoring period.

PROJECT PERFORMANCE STANDARDS

Project Name: May Prairie Stream Restoration Project **TSMP Project No.:** 02-004-04
Stream Name: UT to Hunt Creek **Stream Reach:** C

Habitat Assessment Criteria		**Pre-project RBP Score**	**Median Ecoregion Reference Score**	**Target RBP score at end of monitoring period[1]**
RBP Habitat Assessment Score		95	140	105
Morphology Criteria			**Design Value or Value Range[2]**	**Target value range (min./max.)**
Riffle	Bankfull Cross-sectional Area (A_{bkf})		8.8	7.0-11.0
	Bankfull Width (W_{bkf})		15.0	11.0-19.0
	Bankfull Mean Depth (d_{bkf})		0.6	0.4-0.8
	Width/Depth Ratio		25.6	19.2-32.0
	Entrenchment Ratio		>2.2	>2.2
Pool	Bankfull Cross-sectional Area (A_{bkf})		28.8	24.0-48.0
	Bankfull Width (W_{bkf})		17.0	13.0-21.0
	Max. Depth (D_{max})		2.5	1.5-3.5
Profile	Avg. WS Slope		0.0030	0.0020-0.0040
	Ratio: Riffle Slope/Avg. WS slope		1.6-3.3	1.0-4.0
	Ratio: Pool Slope/Avg. WS slope		0.0-0.2	0.0-0.3
	Ratio: Pool-pool Spacing/Bankfull Width (W_{bkf})		2.4-5.2	1.9-6.2
Stability Criteria		**Stream Type**	**Pre-project Rating/Condition**	**Monitored Condition**
Channel Stability Evaluation Rating		C 6	Good-Fair	"Good" during every monitored year
Hydrology Criteria				**Bankfull Flow Occurrence**
Bankfull Stage				Bankfull event occurs in minimum of 2 of the 5 years monitored[3]

1. Greater than 75% of median ecoregion reference score.
2. To be replaced with actual as-built values or range upon completion of baseline monitoring.
3. Given normal precipitation patterns during the monitoring period.