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ENGINEERING & TESTING, INC.

Excavated Material Storage Area for SR-222 Reconstruction and Widening from near SR-468 to Campground Road

HAYWOOD COUNTY, TN

Stormwater Pollution Prevention Plan

Submittal Date:

April 23, 2024

April 2024
BFW Ref. # 23391

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LIST OF ACRONYMS AND ABBREVIATIONS

BFW	Bacon Farmer Workman Engineering & Testing, Inc.
BMP	Best Management Practices
DNR	Department of Natural Resources
EFO	Environmental Field Office
EPA	Environmental Protection Agency
EPSC	Tennessee Erosion Prevention/Sediment Control Handbook
FEMA	Federal Emergency Management Act
FIRM	Flood Insurance Rate Map
HPA	Historic Preservation Agency
GPC	General NPDES Construction Permit
lbs	pounds
MS4	Municipal Separate Storm Sewer System
NAD	North American Datum
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
PE	Professional Engineer
SWPPP	Storm Water Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture

1. CONSTRUCTION SITE SWPPP

1.1 INTRODUCTION

Ford Construction Company has been awarded by Tennessee Department of Transportation (TDOT) for the reconstruction and widening of SR-222 from SR-468 to Campground Road in Haywood County, Tennessee. The reconstruction and widening will require the removal of approximately 220,000 cubic yards of unclassified material to an excavated material storage area. An adjacent site has been located 0.45 miles west of the proposed intersection improvement. The total disturbed area for this TDOT waste site, including the staging area, topsoil stockpile, and access road is calculated to be 47.4 acres.

The components of the Storm Water Pollution Prevention Plan (SWPPP) for this site were developed according to Tennessee Department of Environment and Conservation (TDEC), General National Pollutant Discharge Elimination System (NPDES) Permit TNR100000 (Permit) for discharges of stormwater associated with construction activities. This SWPPP was developed and prepared by an individual with professional engineering practices, who has a working knowledge of erosion prevention and sediment controls such as Certified Professional in Erosion and Sediment Control (CPESC), and/or successfully completed the TDEC 'Level II Design Principles for Erosion Prevention and Sediment Control for Construction Sites' course.

This SWPPP identifies potential sources of pollution that one would reasonably expect to affect the quality of storm water discharges from this construction site. The SWPPP describes the implementation practices that will be used to ensure a reduction of pollutants in storm water associated with construction activities at this site that has been designed to comply with the terms and conditions of the Tennessee General Permit No. TNR100000 (Discharges of Storm Water Associated with Construction Activities).

The erosion and sediment control measures referenced in the Erosion and Sediment Control Plan and SWPPP were designed for 5-year/24-hour storm events, which is about 4.83" for this project site based on National Weather Services, NOAA Atlas 14.

Storm water runoff from the waste and borrow sites discharge into an unnamed tributary of Big Muddy Creek (TN08010208007_0400) that lied immediately west of the proposed waste site. According to TDEC Final 2022 303(d) list, this stream is not listed in the 303(d) list. Storm water from the site does not discharge to an Exceptional Tennessee Streams or an approved TMDL. Also, surface runoff does discharge into any MS4 that is permitted with the Tennessee Division of Water Resources.

The Ford Construction Company will keep a copy of the SWPPP on-site during the excavated material storage area land disturbance activities.

1.2 SITE INFORMATION

Project Name and Location: Excavated Material Storage Area for SR-222 Reconstruction and Widening from near SR 468 to Campground Road

Property Parcel Number (Optional): 137 003.00

Operator Name and Address: Newman Amy Etvir Glenn

1.3 SWPPP NARRATIVE

1.3.1 A description of all construction activities at the site, including the intended sequence of activities which disturb soils for major portions of the site (e.g., grubbing, excavation, grading, utilities and infrastructure installation).

The constructions activities consist of removing and stockpiling topsoil, excavated material storage activities, spreading topsoil, and final stabilization.

The intended sequence of activities is:

- Install temporary construction exit. Install perimeter silt fence at the down gradient of the disturbed area as a temporary perimeter control.
- Install two (2) outfalls with rock check dams for stormwater filtration.
- Stockpile topsoil.
- Placement of excavated material from the widening and reconstruction of SR-222 from SR-468 to Campground Road.
- Topsoil replacement and permanent stabilization.

1.3.2 Estimates of the total area of the site and the total area that is expected to be disturbed by excavation, grading, filling, or other construction activities.

Total Area of the Site: 47.4 Acres

Total Disturbed Area: 47.4 Acres

The total disturbed area is calculated to be 47.4 acres for the access road, topsoil stockpiling, and material waste storage.

1.3.3 A description of the topography of the site, including an estimation of percent slope and delineation of drainage area (acres) serving each outfall. Drainage area estimates shall include off-site drainage, if applicable.

The existing topography at the location of the proposed waste site is very flat with minimum grade. See Table 1 for drainage area and estimated percent slope by each outfall.

Table 1. Outfall Locations

Outfall Point No.	Road Station/ Location	Drainage Information		Average Percent Slope Toward Outfall
		Area (Acre)	Description	
1	East side of Property	5.1	WWC	0.18%
2	Northeast side of Property	7.7	WWC	0.56%

1.3.4 Hydric Soils

According to the soil map information obtained from USDA, Haywood County Soil Conservation Service, Tennessee, the proposed location consists primarily

of three soil types which include Adler silt loam, Loring silt loam, and Feliciana silt loam.

The characteristics of silt loam represent an erosion risk. The soil is susceptible to erosion and careful erosion prevention and control is needed. The erosion potential has resulted in the use of BMP's such as temporary construction exit (Standard Drawing 7.28) and silt fence (Standard Drawing 7.34). These erosion controls are designed to filter, detain, reduce flow velocity, or retard runoff and reduce/prevent sediment traveling off-site. The quality of discharge from properly implemented and maintained EPSC measures is expected to be sufficient to comply with the terms and conditions of this permit.

According to USDA Haywood County soil report, none of the three soil types found at the waste site are rated as hydric. Data search on National Wetlands Inventory from US Fish and Wildlife Services indicated that the proposed borrow site does not show wetland areas in the waste site but does show them immediately adjacent to the property in the wooded riparian areas of the unnamed tributary of Big Muddy Creek.

1.3.5 A description of how the runoff will be handled to prevent erosion at the permanent outfall and receiving stream.

Prior to any construction activities, silt fence will be installed along the down gradient of the property to prevent sediment from migrating off-site. Also, a temporary construction exit will be installed to prevent sedimentation from being deposited along SR-222.

The surface runoff from the proposed waste site has six sub-drainage areas. These are depicted in the table below.

Table 2. Sub-Drainage Locations

Sub-Drainage Area	Acreage of Sub-Drainage Location	Drainage Location
Northeast	7.7	Outfall 002
Northeast	5.1	Outfall 001
Central	9.6	Sheetflows
Central	9.88	Sheetflows
South	3.99	Sheetflows
South	9.63	Sheetflows

1.3.6 An erosion prevention and sediment control (EPSC) plan with the proposed construction area clearly outlined. The plan shall indicate the boundaries of the permitted area, drainage patterns, approximate slopes anticipated after major grading activities, areas of soil disturbance, an outline of areas which are not to be disturbed, the location of major structural and nonstructural controls identified in the SWPPP, the location of areas where stabilization practices are expected to occur, streams and sinkholes, and identification on the erosion control plan of

outfall points intended for coverage. The erosion control plan must meet requirements stated in Section 5.5.3.

- Please see the attached EPSC Plan (Section 9), and USGS map (Section 7) for the EPSC measures, grading boundary and drainage patterns.
- The areas that will have soil disturbance are designated on the erosion and sediment control plans as slope lines. Perimeter silt fence (Standard Drawing 7.34) will be installed along the perimeter at the down gradient of the site to prevent sediment from migrating offsite.
- The location of major structural and non-structural erosion controls is on the Erosion Prevention and Sediment Control Plans in Section 9.
- Permanent stabilization with erosion control measures will occur at all the disturbed areas.
- There is a wetland adjacent to the project site but no identified wetlands were located in the waste area.
- This project does not discharge into water impaired by siltation/sedimentation or into an Exceptional Tennessee Water, or an approved TMDL.
- No sediment laden runoff is allowed to pump into any of the existing wet weather conveyance or stream without pre-treatment or sedimentation.

1.3.7 A description of any discharge associated with industrial activity other than construction stormwater that originates on site and the location of that activity and its permit number.

There are no discharges associated with industrial activities affecting the project site.

1.3.8 Identification of any streams on or adjacent to the project, a description of any anticipated alteration of these waters and the permit number or the tracking number of the Aquatic Resources Alteration Permit (ARAP) or Section 401 Certification issued for the alteration.

No Wetlands were observed at the project site.

1.3.9 The name of the receiving waters (this does not include wet weather conveyances connecting the site discharge to the receiving stream).

The receiving water is:

Table 2. Stream.

Stream Label	Name of Stream	Impaired for siltation or habitat alteration (Yes or No)	Known exceptional Tennessee water (Yes or No)
S-1	Unnamed Tributary of Big Muddy Creek (TN08010208007_0400)	No	No

1.3.10 Identification if those receiving waters have unavailable parameters for siltation.

According to DWR Construction Permitting Map Viewer, the unnamed tributary to Big Muddy Creek is not listed as a 303(d) listed stream.

1.3.11 Identification if those receiving waters are Exceptional Tennessee Waters

According to DWR Construction Permitting Map Viewer, the receiving streams are not listed as Exceptional Tennessee Water.

1.3.12 If applicable, clearly identify and outline the buffer zones established to protect waters of the state located within the boundaries of the project.

The riparian buffer zone should be established between the top of the stream bank and the disturbed area. The 60-foot width of the buffer zone for 303(d) listed stream criterion, and Exceptional Tennessee Water (ETW) can be established on an average width basis at the site if the minimum width of the buffer zone is more than 30 feet at any measured location. Also, the 30-foot buffer zone for non-303(d) listed stream, and none-ETW criterion can be established on an average width basis at the site if the minimum width of the buffer zone is more than 15 feet at any measured location.

The unnamed tributary of Big Muddy Creek is approximately 2,900 feet northeast of the proposed borrow site and thus met or exceeded the buffer zone requirement.

1.3.13 A description of the construction phasing for projects of more than 50 acres (Subsection 5.5.3.2).

This does not apply to this project due to the disturbed area being 47.4 acres. However, the limit of disturbance will be staked on site prior to any earth disturbing activities.

1.3.14 The timing of the planting of the vegetation cover must be discussed in the SWPPP if permanent or temporary vegetation is to be used as a control measure. Planting cover vegetation during winter months or dry months should be avoided.

Stabilization measures will be initiated where construction activities have temporarily or permanently ceased. Temporary or permanent soil stabilization at the construction site shall be completed within two weeks after the construction activity in that portion of the site has temporarily or permanently ceased except for steep slope, which shall be stabilized within a week.

The contractor will permanently stabilize all the disturbed areas with mulch and seed. During the dry season, the contractor will water the mulch with seeded area. The contractor will re-seed the area if the vegetation would not survive the winter season. The site is permanently stabilized when perennial vegetation has established 70% uniform coverage for the contractor to submit a Notice of Termination (NOT).

1.4 DISCHARGE QUALITY

There shall be no distinctly visible floating scum, oil or other matter contained in the storm water discharge as a result of the construction activities. The storm water discharge must not cause an objectionable color contrast in the receiving stream.

The storm water discharge must result in no materials in concentrations sufficient to be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and

aquatic life in the receiving stream.

Normal traffic along SR-222 will be open for traffic during the waste site earthwork activities. Some non-point discharge of oil and other matter is always present in storm water discharge from active roadways. No additional discharge, beyond reasonably expected from an active roadway, shall result from the construction activities.

1.5 INSPECTION

The contractor shall be responsible for conducting twice weekly inspections in accordance with the NPDES Permit and SWPPP. The twice weekly inspection shall be performed at least 72 hours apart.

The twice weekly inspections can be performed by:

- a person with a valid certification from TDEC “Fundamentals of Erosion Prevention and Sediment Control Level I course,
- a licensed Professional Engineer or Landscape Architect,
- a Certified Professional in Erosion and Sediment Control (CPESC), or
- a person who has successfully completed the “Level II Design Principles for Erosion Prevention and sediment Control for Construction sites” course.

1.6 SITE ASSESSMENT

No outfall on the site discharges five or more acres of total drainage area into an impaired stream or Exceptional Tennessee Water. Therefore, a Quality Assurance Site Assessment is not required for this site.

1.7 SEDIMENT BASIN

No outfall on the site discharges five or more acres of total drainage area into an impaired stream or Exceptional Tennessee Water. Therefore, a sediment basin is not required for this site.

1.8 POST-CONSTRUCTION STORMWATER MANAGEMENT

Describe measures installed during the construction process to control pollutants in stormwater discharges that will occur after construction operations have been completed:

After the waste site storage has been completed, the contractor will spread the topsoil, stabilize the site with mulch and seed. A Notice of Termination will be submitted to TDEC and there is no need for any pollution control in stormwater discharges, and an acceptable perennial vegetation is established.

2. CONSTRUCTION MANAGEMENT TECHNIQUES

The goal of this SWPPP is to maintain and protect the natural, physical, chemical, biological characteristics and functions of the receiving water by minimizing the dislodging and suspension of soil in runoff and by retaining mobilized sediment on-site.

2.1 PRECONSTRUCTION AND DURING CONSTRUCTION

Preconstruction planning should be used to sequence major grading activities to minimize the exposure time of graded or denuded areas. The erosion prevention and sediment control measures shall be modified as necessary so that they are always effective throughout the course of the project. The Operator will be responsible for the implementation and execution of all storm water runoff controls. Preconstruction ground cover will not be destroyed, removed, or disturbed more than 14 days prior to grading or earth moving unless the area is seeded and/or mulched or other temporary cover is installed. Temporary erosion control measures may be removed at the beginning of the workday but will be replaced at the end of the day. The structural controls to be used on this project and their placement are identified on the Erosion Prevention and Sediment Control Plans in Section 9.

2.2 STABILIZATION, STRUCTURAL, AND NON-STRUCTURAL CONTROLS

Storm water runoff controls for the proposed project will consist of structural control measures and the maintenance and inspection practices discussed later in this SWPPP. They have been designed to retain sediment on the project site. The following paragraphs describe the sequence of major construction activities that are planned for the site and the general stabilization and structural practices that will be associated with each activity. They also identify the party responsible for implementing the SWPPP.

2.3 CLEARING AND GRUBBING

Clearing and grubbing must be held to the minimum necessary for grading and equipment operation. Erosion prevention and sediment control structures must be in place and functional before clearing, grubbing, excavation, grading, cutting, or filling occurs, except as such work may be necessary to install erosion prevention and sediment control measures. Project plans, proposal contract, and standard drawings referenced in the project plans provide additional information regarding requirements for erosion prevention and sediment control and protection of waters of the State and the United States.

Only the areas where grading and earth-moving activities are planned within 14 days will be cleared unless they are to be subsequently seeded and/or mulched or other temporary cover is installed.

Stabilization practices rely primarily on seeding (with mulch) of cleared and grubbed areas prior to other construction activities. Temporary seeding will be accomplished by using seed groups adapted for germination and growth during the subject season. Delay in planting cover vegetation until winter months (December – March) should be avoided, if possible.

Structural practices include silt fence, and inlet protection (typical pavement inlet protection). These items will be installed prior to and during clearing operations.

2.4 DRAINAGE STRUCTURE CONSTRUCTION

Stabilization practices for drainage structure construction rely primarily on installation of

inlet protection (rock silt screens) and outlet protection (riprap), rock check dams, erosion control blanket, sod, and permanent seeding (with mulch) of cleared and grubbed areas prior to other construction activities. Stabilization will be completed within 14 days of final grading or earth-moving activities. Additionally, diversion channels will be stabilized with rock, erosion matting, sod or seeding while drainage structures are constructed. Drainage structure construction and bank grading shall be complete and stabilized prior to flow being diverted back to its original course.

2.5 GRADING AND EXCAVATION

Stabilization practices for this sequence include bringing cut and fill slopes to final grade and stabilizing with erosion control blankets, and/or seeding and mulching. Stabilization measures shall be initiated as soon as practicable on portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen (14) days after the construction activity on that portion of the site has temporarily or permanently ceased, except in the following two situations:

- Where the initiation of stabilization measures is precluded by snow cover or frozen ground conditions or adverse soggy conditions. Stabilization measures shall be initiated as soon as practicable; or
- Where construction activity on a portion of the site has temporarily ceased, and earth disturbing activities will be resumed within 14 working days. Temporary stabilization measures do not have to be initiated on that portion of the site.

Steep slopes (35% grade or greater) shall be temporarily stabilized no later than seven days after construction activities on the slope have temporarily ceased.

Area of the completed phase must be stabilized within 14 days. Permanent or temporary seeding will be accomplished by using seed groups adapted for germination and growth during the subject season. Delay in planting cover vegetation until winter months (December – March) should be avoided, if possible.

Structural practices for grading and construction activities will include the following: installation of silt fence, mulch, and seed as required. This will include the final dressing of slopes, placement of topsoil, seed, and mulch.

2.6 FINAL STABILIZATION

Permanent or temporary seeding will be accomplished by using seed groups adapted for germination and growth during the subject season. Delay in planting cover vegetation until winter months (December – March) should be avoided, if possible. Stabilization must be completed within 14 days after final grading or earth-moving activities have ceased.

All permanent structural practices have been completed at this point of the project. After final stabilization has been achieved, all silt fencing will be removed to prevent them from becoming pollutants.

2.7 SEED GROUP

Group A (February 1 – July 1)	
Kind of Seed	Quality, Percent by Weight
Kentucky 31 Fescue	80
Korean Lespedeza	15
English Rye	5
Group B (June 1 – August 15)	
Kind of Seed	Quality, Percent by Weight
Kentucky 31 Fescue	55
English Rye	20
Korean Lespedeza	15
German Millet	10
Group B1 (April 15 – August 15)	
Kind of Seed	Quantity, Percent by Weight
Bermudagrass (hulled)	70
Annual Lespedeza	30
Group C (August 1 – December 1)	
Kind of Seed	Quantity, Percent by Weight
Kentucky 31 Fescue	70
English Rye	20
White Clover	10
Group C1 (February 1 – December 1)	
Kind of Seed	Quantity, Percent by Weight
Crown Vetch	25
Kentucky 31 Fescue	70
English Rye	5

All mixes have an application rate of 2.5 lbs. per 1,000 square feet.

3. RAINFALL MONITORING PLAN & INSPECTION

Erosion prevention and sediment control measures and devices are utilized to minimize the dislodging and suspension of soil in runoff and to retain mobilized sediment on-site. Storm water runoff is directly proportional to the intensity and duration of a given rainfall event. Rainfall monitoring is necessary to estimate the effectiveness of erosion prevention and sediment control measures and devices at the project site. The intent of the plan is to provide a means to record the depth of rainfall and the period in which it fell in order to estimate the intensity of the rainfall event.

3.1 EQUIPMENT

At a minimum, a fence post type rain gauge will be used to measure rainfall. The standard fence post rain gauge shall be a wedge-shaped gauge that measures up to six (6) inches (150mm) of rainfall (e.g., Tru-Chek® Direct-Reading Rain Gauge). An English scale should be provided on one face, with a metric scale on the other face. Graduation shall be permanently molded in durable weather-resistant plastic. The minimum graduations shall be 0.01 inch (or 0.1mm). An aluminum bracket with screws may be used for mounting the gauge on a wooden support.

3.2 LOCATION

The rain gauge will be located at or along the project site, as defined in the NOI of the NPDES Permit, in an open area such that the measurement will not be influenced by outside factors (i.e., overhangs, gutters, trees, etc.). At least one rain gauge will be located within each linear mile (as measured along the centerline of the primary alignment) of the project where clearing, grubbing, grading, cutting, or filling is being actively performed, or exposed soil has not yet been permanently stabilized.

3.3 METHODS

The rain gauge shall be checked after every rainfall event occurring on the project site. Detailed records of the rainfall event(s) including dates, amounts of rainfall, and the approximate duration or starting and ending times shall be maintained.

3.4 MAINTENANCE

Maintenance activities will be undertaken to ensure that vegetation, erosion and sediment control measures, and other protective measures identified in the site Erosion and Sediment Control Plans are kept in good and effective operating condition. Maintenance needs identified in inspections or by other means shall be accomplished within twenty-four (24) hours after the inspection unless conditions make a particular activity impracticable. In a case where the activity is deemed impracticable, any such condition shall be documented. The need for maintenance will be determined through the inspection procedures listed below and will include, but not be limited to, the following practices:

- Observation of control measures to determine compliance with the manufacturer's specifications and good engineering practices for installation and use of the control;
- Removal of off-site sediment accumulations from the project site that have not reached a sinkhole and/or stream such that off-site impacts are minimized (Note: Sediment accumulations from the project site that have reached sinkholes and/or streams must not be removed until after consultation with TDEC);

- Removal of sediment from check dams, silt fence, and other sediment controls when the design capacity has been reduced by 50 percent; and
- Pickup or otherwise prevention of litter, construction debris, and construction chemicals from becoming a pollutant source prior to anticipated storm events.

In addition to the practices listed above, the project will be inspected as required by this SWPPP to ensure the maintenance and effectiveness of the erosion prevention and sediment control measures in case of failure of the operator to control project related erosion or siltation.

The inspection schedule and documentation procedures have been designed to ensure that vegetation, erosion, sediment control measures, and other protective measures identified in the SWPPP are kept in good and effective operating condition. If the site description and pollution prevention measures in the SWPPP need to be revised based on the results of the inspection, those revisions will be completed as appropriate, but no later than seven (7) calendar days following the inspection identifying the need.

3.5 SCHEDULE

The schedule for inspections will be as follows:

- Inspections shall be performed at least twice every calendar week. Inspections shall be performed at least 72 hours apart. Where sites or portion(s) of the sites that have been temporarily stabilized, or runoff is unlikely due to winter conditions (e.g., site covered with snow or ice), such inspection only must be conducted once per month until thawing results in runoff or construction activity resumes. Inspection requirements do not apply to definable areas that have been finally stabilized. Written notification of the intent to conduct only monthly inspections and the justification for such request must be submitted to the local Environment Field Office.
- Inspections shall be performed at least twice per week during any construction activities and thereafter until the site is fully constructed and all disturbed areas not paved, concreted, or cover by stone are permanently stabilized with a uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover after Notice of Termination is approved by the Division of Water Pollution Control.

3.6 DOCUMENTATION REQUIREMENTS

All inspections shall be documented on the TDEC Construction Stormwater Inspection Certification form for all construction sites. An alternative inspection form may be used if the form contents and the inspection certification language are, at a minimum, equivalent to the TDEC Division's form and the permittee has obtained a written approval from TDEC to use the alternative form. Inspection documentation will be maintained on site and made available to TDEC upon request. Inspection reports must be submitted to the TDEC within 10 days of the request. If TDEC requests the Construction Stormwater Inspection Certification form to be submitted, the submitted form must contain the printed name and signature of the trained certified inspector and the person who meets the signatory requirements of Section 7.7.2 of the General NPDES permit.

A sample inspection form for this project is included in Section 11, Appendix C. The operator must certify on a weekly basis that the weekly inspection of erosion and sediment controls and outfall points were performed and whether all planned and

designed erosion and sediment controls are installed and in working order. Inspection reports must be signed by an eligible person or his or her duly authorized representative.

3.7 AREAS TO BE INSPECTED

Qualified personnel will inspect disturbed areas of the project site that have not been finally stabilized for evidence of, or the potential for pollutants to enter the drainage system. These areas include, but are not limited to, the following:

- Disturbed areas and areas used for storage of materials that are exposed to precipitation.
- Erosion prevention and sediment control measures identified in the SWPPP.
- Outfall points (where discharges leave the site or enter waters of the State). Where outfall locations are inaccessible, the nearest possible downstream locations shall be inspected.
- Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.
- Fueling station(s) on-site (if applicable).

These inspection requirements do not apply to definable areas of the site that have met the final stabilization requirement and have been noted in the SWPPP.

3.8 REPAIR, MODIFICATIONS, AND REVISION

Based on the results of the inspection, any inadequate control measures or control measures in disrepair shall be replaced or modified, or repaired as necessary, within twenty-four (24) hours after the inspection, unless conditions make a particular activity impracticable. In a case where the activity is deemed impracticable, any such condition shall be documented.

3.9 OTHER ITEMS REQUIRING INSPECTION

3.9.1 Construction Materials

Construction materials that are anticipated to be present at this construction site include:

- Earth and gravel.

Stockpiled erodible construction materials will be secured by control measures down gradient of the stockpiles. Non-erodible materials will be picked up to prevent them from polluting storm water. The contractor may keep several portable storage units on the project site to store construction equipment.

3.9.2 Waste Materials

Waste material (earth, rock, asphalt, concrete, etc.) not required for the construction activities of the project shall be disposed of by the operator. The operator will be required to obtain any and all necessary permits including, but not limited to, NPDES, Aquatic Resources Alternation Permit(s), Corps of Engineers Section 404 permits, and TVA Section 26A permits to dispose of waste material.

3.9.3 Other Materials

Other materials not used for construction activities, but needed for construction

activities at the proposed site must also be controlled to prevent pollution of the receiving waters. These items include, but are not limited to, the storage and dispensing of the following:

- Fertilizers and Lime
- Diesel and Gas
- Machinery Lubricants (oil and grease)

Soils at fueling stations should be checked daily for signs of spillage or staining of the soil. Any fixed fueling station/tank storage shall have a containment system to prevent runoff by potential spills or tank rupture. Machinery should be serviced or repaired to prevent leaks of fluids.

The operator will be responsible for compliance with all applicable Environmental Protection Agency (EPA) and USDOT guidelines regarding equipment-related fluids, as well as all National Fire Protection Association regulations regarding flammable liquids. No construction materials are expected to produce pollutant runoff.

3.10 NON-STORM WATER DISCHARGES

The following non-storm water discharges have potential for occurring from the site during the construction activities period:

- Groundwater may be intercepted during the construction activities of this project. While these locations are yet unknown, the SWPPP will be modified to incorporate these areas should they arise;
- Pavement wash waters (where there have been no spills or leaks of toxic or hazardous materials);
- Dust suppression water; and
- Water used to wash vehicles (where detergents are not used and detention and/or filtering are provided before the water leaves the site).

All non-storm water discharges will be directed to stable discharge reduction structures prior to leaving the site outfall. Wash down or waste discharge of concrete trucks will not be permitted on-site unless a proper settlement area has been constructed in accordance with both state and federal regulations as required by Department contractual provisions.

4. REPORTING AND RECORD KEEPING REQUIREMENTS

4.1 REQUIRED RECORDS

The operator will maintain at the site the following records of construction activities:

- The dates when major grading activities occur;
- The dates when construction activities temporarily or permanently cease on a portion of the site;
- The dates when stabilization measures are initiated;
- Records of inspections and corrective measures, including photographs of representative items requiring correction and the corrective action taken for it; and
- Detailed records of rainfall events including dates, amounts of rainfall, and the approximate duration or starting and ending times.

4.2 KEEPING SWPPP CURRENT

The Operator will amend the SWPPP when any of the following conditions apply:

- Whenever there is a change in the scope of the project that would be expected to have a significant effect on the discharge of pollutants to the waters of the State and which has not otherwise been addressed in the SWPPP;
- Whenever inspections or investigations by site operators, local, state, or federal officials indicate the SWPPP is proving ineffective in eliminating or significantly minimizing pollutants from construction activity sources, or is otherwise not achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity;
- When any new operator and/or sub-operator is assigned or relieved of their responsibility to implement a portion of the SWPPP; and
- When the SWPPP must be modified to prevent a negative impact to legally protected state or federally listed or proposed threatened or endangered aquatic fauna.

The Operator should include measures necessary to prevent a negative impact to legally protected state or federally listed fauna or flora (or species proposed for such protection).

4.3 MAKING PLANS ACCESSIBLE

The permittee shall retain a copy of the SWPPP required by this permit (including a copy of the permit) at the project site (or other local location accessible to TDEC director and the public) from the date excavation commences to the date of termination of permit coverage. Once coverage is terminated, the permittee shall maintain a copy of all records for a period of three years.

Prior to the initiation of land disturbing activities and until the site has met the final stabilization criteria, the operator will post a notice near the main entrance of the project site accessible to the public with the following information:

- A copy of the Notice of Coverage (NOC) with the NPDES permit number for the project;

- Name, company name, E-mail address (if available), telephone number and address of the project site owner or a local contact person;
- A brief description of the project; and
- The location of the SWPPP. (Especially important if the site is inactive or does not have an on-site location at which to store the SWPPP.)

If posting this information near a main entrance is infeasible due to safety concerns, the notice shall be posted in a local building. The notice must be placed in a publicly accessible location where construction is actively underway and moved as necessary. The Operator understands that this permit does not provide the public with any right to trespass or require that the Operator allow members of the public to access the project site for any reason, including inspection of a site.

4.4 NOTICE OF TERMINATION

When all storm water discharges from the project activities that are authorized by the permit are eliminated by final stabilization, the primary permittee will submit a Notice of Termination (NOT) that is signed in accordance with the permit to the Environmental Field Office. For the purposes of the certification required by the NOT, the elimination of storm water discharges associated with the project activity is understood to mean the following:

- That all disturbed soils at the portion of the project site where the operator had control have been finally stabilized;
- Temporary erosion and sediment control measures have been or will be removed at an appropriate time to ensure final stabilization is maintained; or
- That all storm water discharges associated with construction activities from the identified site that are authorized by a NPDES general permit have otherwise been eliminated from the portion of the project site where the operator had control.

The NOT will be submitted on the TDEC's NOT form.

4.5 RETENTION OF RECORDS

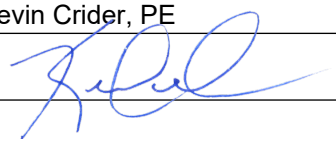
The permittee shall retain copy of the SWPPP required by this permit (including a copy of the permit) at the project site (or other local location accessible to TDEC director and the public) from the date construction commences to the date of termination of permit coverage. Permittee with day-to-day operational control over pollution prevention plan implementation shall have a copy of the SWPPP available at a central location on-site for the use of all operators and those identified as having responsibilities under the plan whenever they are on the construction site. Once coverage is terminated, the permittee shall maintain a copy of all records for a period of three years.

Knowingly making any false statement on any report required by this rule may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Water Pollution Control Act and in T.C.A. §69-3-115 of the Tennessee Water Quality Control Act.

5. SIGNATORY OF PRIMARY AND SECONDARY PERMITTEES

A. I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment of knowing violations. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is mage under penalty of perjury.

Name: Kevin Crider, PE Title: Project Engineer

Signature:  Date: April 24, 2024

B. I certify under penalty of law that I have reviewed this document, any attachments, and the SWPPP referenced above. Based on my inquiry of the construction site owner/developer identified above and/or my inquiry of the person directly responsible for assembling this Notice of Intent and SWPPP, I believe the information submitted is accurate. I am aware that this NOI, if approved, makes the above-described construction activity subject to NPDES permit number TNR100000, and that certain of my activities on-site are thereby regulated. I am aware that there are significant penalties, including the possibility of fine and imprisonment for knowing violations, and for failure to comply with these permit requirements. As specified in Tennessee Code Annotated Section 39-16-702(a)(4). This declaration is made under penalty of perjury.

Name: Richard Gatlin, PE Title: Design Build Project Manager

Signature: Richard Gatlin Date: April 24, 2024

6. TENNESSEE DEPARTMENT OF CONSERVATION NOTICE OF INTENT

6.1 NOTICE OF INTENT (NOI) FOR GENERAL NPDES PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES (TNR100000)

Purpose of this form - A completed notice of intent (NOI) must be submitted to obtain coverage under the Tennessee General NPDES Permit for Discharges of Stormwater Associated with Construction Activity (permit). **Requesting coverage under this permit means that an applicant has obtained and examined a copy of this permit, and thereby acknowledges applicant's claim of ability to be in compliance with permit terms and conditions.** This permit is required for stormwater discharge(s) from construction activities including clearing, grading, filling, and excavating (including borrow pits) of one or more acres of land. This form should be submitted at least 30 days prior to the commencement of land disturbing activities, or no later than 48 hours prior to when a new operator assumes operational control over site specifications or commences work at the site.

The appropriate permit application fee must accompany the NOI and is based on total acreage to be disturbed by an entire project, including any associated construction support activities (e.g., equipment staging yards, material storage areas, excavated material disposal areas, borrow or waste sites):

i.	Projects equal to or greater than 150 acres	$10,000
ii.	Projects equal to or greater than 50 acres and less than 150 acres	$6,000
iii.	Projects equal to or greater than 20 acres and less than 50 acres	$3,000
iv.	Projects equal to or greater than 5 acres and less than 20 acres	$1,000
v.	Projects equal to or greater than 1 acre and less than 5 acres	$250
vi.	Projects seeking subsequent coverage under an actively covered larger common plan of development or sale	$100

There is no fee for sites less than one acre. A separate annual maintenance fee is also required for construction activities that exceed one year under general permit coverage. Tennessee Rules, Chapter 0400-40-11-.02(b)(12)).

Who must submit the NOI form? Per Section 2 of the permit, all site operators must submit an NOI form. "Operator" for the purpose of this permit and in the context of stormwater associated with construction activity means any person associated with a construction project who meets either or both of the following two criteria: (1) The person has operational or design control over construction plans and specifications, including the ability to make modifications to those plans and specifications. This person is typically the owner or developer of the project or a portion of the project (e.g. subsequent builder), or the person that is the current landowner of the construction site. This person is considered the primary permittee; or (2) The person has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions. This person is typically a contractor or a commercial builder who is hired by the primary permittee and is considered a secondary permittee.

Owners, developers, and all contractors that meet the definition of the operator in

subsection 2.2 of the permit shall apply for permit coverage on the same NOI, insofar as possible. After permit coverage has been granted to the primary permittee, any separate or subsequent NOI submittals must include the site's previously assigned permit tracking number and the project name. The site-wide site-specific SWPPP shall be prepared in accordance with the requirements of part 5 of the permit and must be submitted with the NOI unless the NOI being submitted is to only add a contractor (secondary permittee) to an existing coverage. Artificial entities (e.g., corporations or partnerships excluding entities not required to register) must submit the TN Secretary of State, Division of Business Services, control number. The Division reserves the right to deny coverage to artificial entities that are not properly registered and in good standing with the TN Secretary of State.

Notice of Coverage - The division will review the NOI for completeness and accuracy and prepare a notice of coverage (NOC). Stormwater discharge from the construction site is authorized as of the effective date of the NOC.

Complete the form - Type or print clearly, using ink and not markers or pencil. Answer each item or enter "NA," for not applicable, if a particular item does not fit the circumstances or characteristics of your construction site or activity. If you need additional space, attach a separate piece of paper to the NOI form. **The NOI will be considered incomplete without a permit fee, a map, and the SWPPP.**

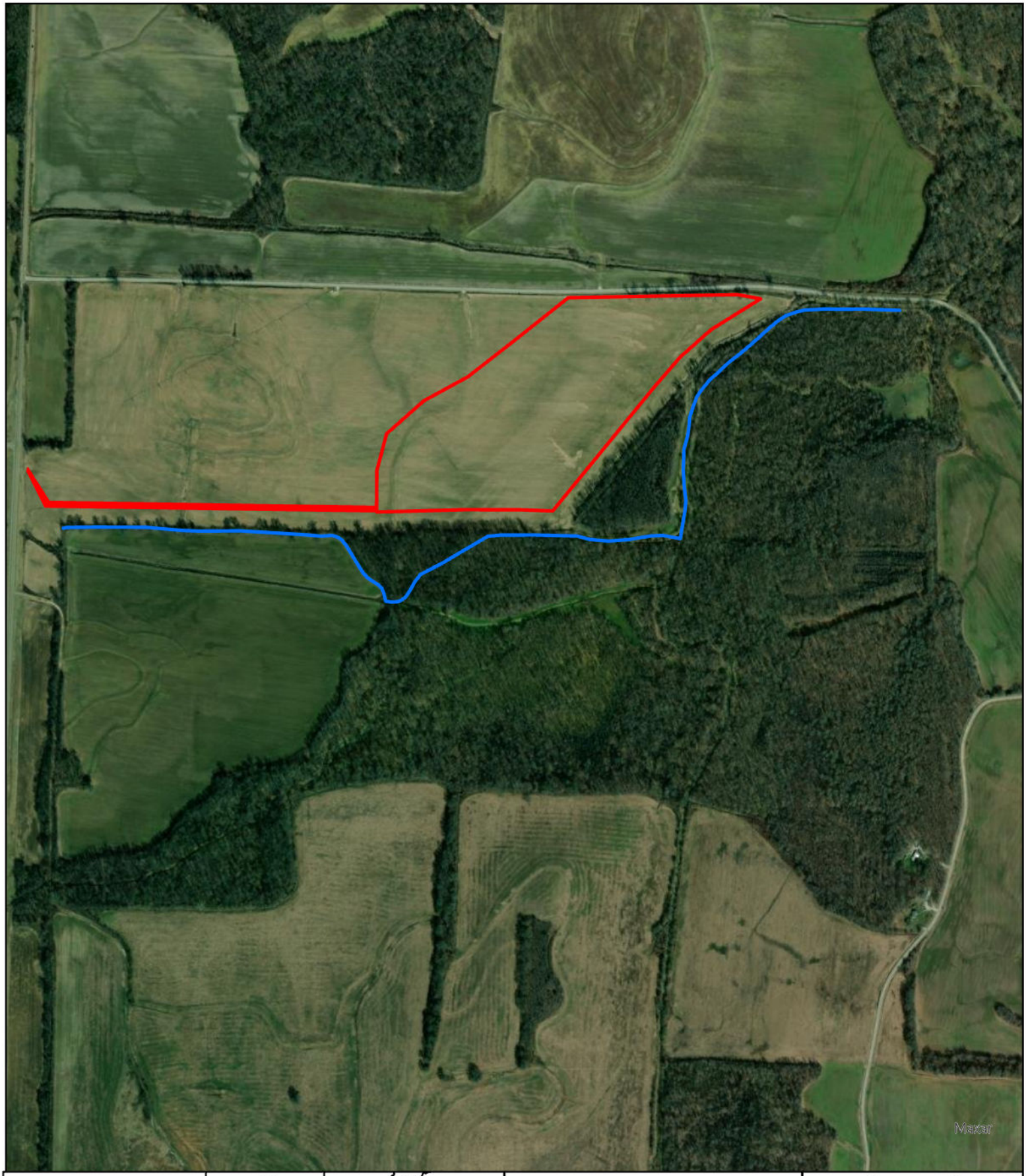
Describe and locate the project - Use the legal or official name of the construction site. If a construction site lacks street name or route number, give the most accurate geographic information available to describe the location (reference to adjacent highways, roads, and structures, e.g., intersection of state highways 70 and 100). Latitude and longitude (expressed in decimal degrees) of the center of the site can be located on USGS quadrangle maps. The maps can be obtained at the USGS World Wide Web site: http://www.usgs.gov/; latitude and longitude information can be found at numerous other web sites. Attach a copy of a portion of a 7.5-minute topographic map, a city map, or a county map showing location of site, with boundaries at least one mile outside the site boundaries. Provide estimated starting date of clearing activities and completion date of the project, and an estimate of the number of acres of the site on which soil will be disturbed, including borrow areas, fill areas, stockpiles and the total acres. For linear projects, give location at each end of the construction area. Give name of the receiving waters - Trace the route of stormwater runoff from the construction site and determine the name of the river(s), stream(s), creek(s), wetland(s), lake(s) or any other water course(s) into which the stormwater runoff drains.

Note that the receiving water course may or may not be located on the construction site. If the first water body receiving construction site runoff is unnamed ("unnamed tributary"), determine the name of the water body that the unnamed tributary enters.

An ARAP may be required - If your work will disturb or cause alterations of a stream or wetland, you must obtain an appropriate Aquatic Resource Alteration Permit (ARAP). If you have a question about the ARAP program, contact your local Environmental Field Office (EFO).

Submitting the form and obtaining more information - Note that this form must be signed by the company President, Vice-President, or a ranking elected official in the case of a municipality, for details see subpart 2.5. For more information, contact your local EFO at the toll-free number 1-888-891-8332 (TDEC). Submit the completed NOI form (keep a copy for your records) to the appropriate EFO for the county(ies) where the construction activity is located, addressed to **Attention: Stormwater NOI Processing**

or use MyTDEC Forms for electronic submittal.



BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

N

0 250 500 1,000 1,500 2,000 ft

1 inch: 1,000 Feet

Figure 3 - Aerial TDOT Waste Site

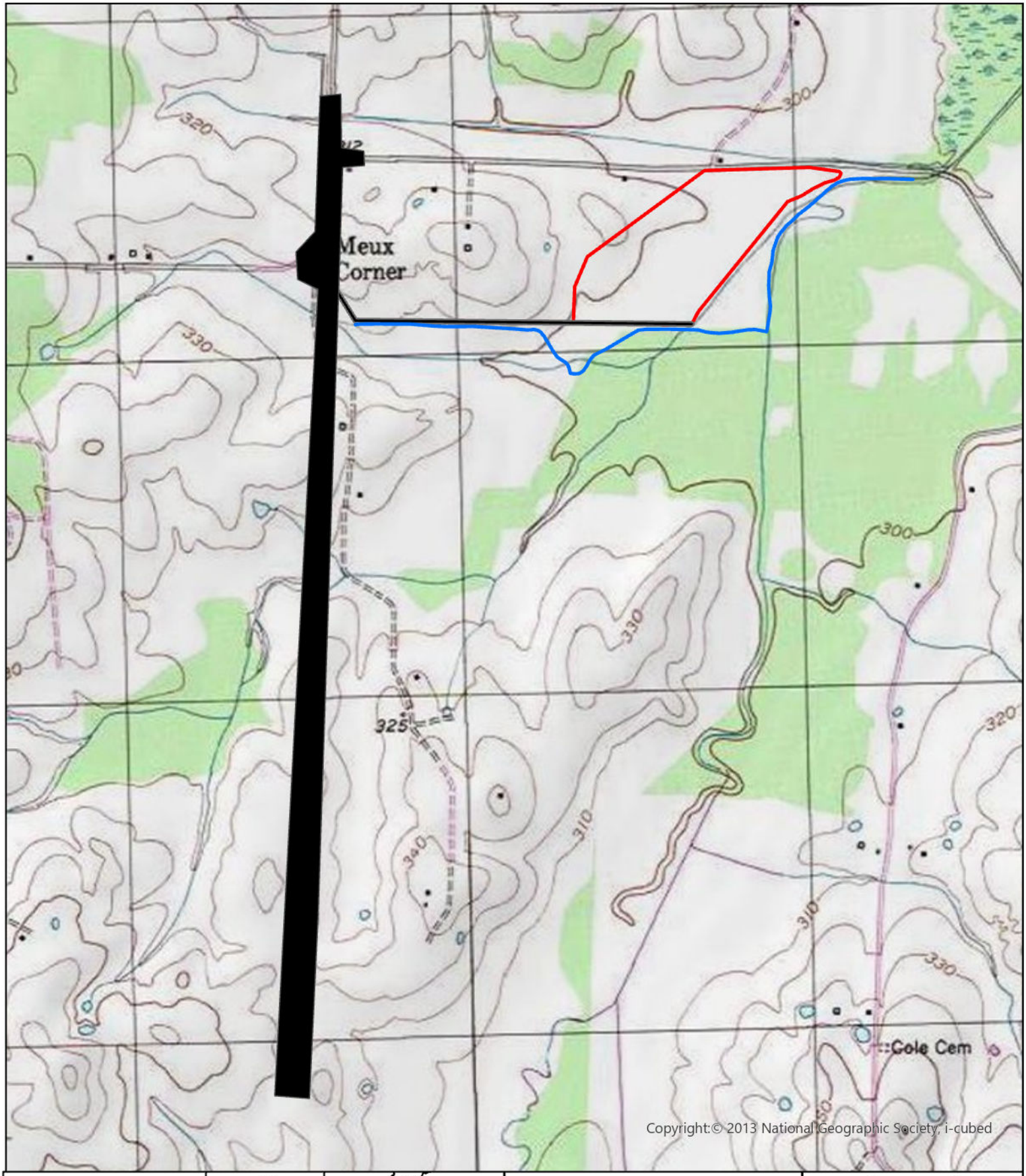
TDOT Design Build DB2301
SR-222 N-Ford Construction
Haywood County, TN

Project Number:	Drafted/Checked by:	Date:
23391	CS	2/15/2024

Legend

- Waste Site
- Stream
- Haul Road

7. USGS QUAD MAP AND WETLAND MAP



BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

N

0 375 750 1,500 2,250 3,000 ft

1 inch: 1,500 Feet

Figure 1 - TDOT Waste Pit

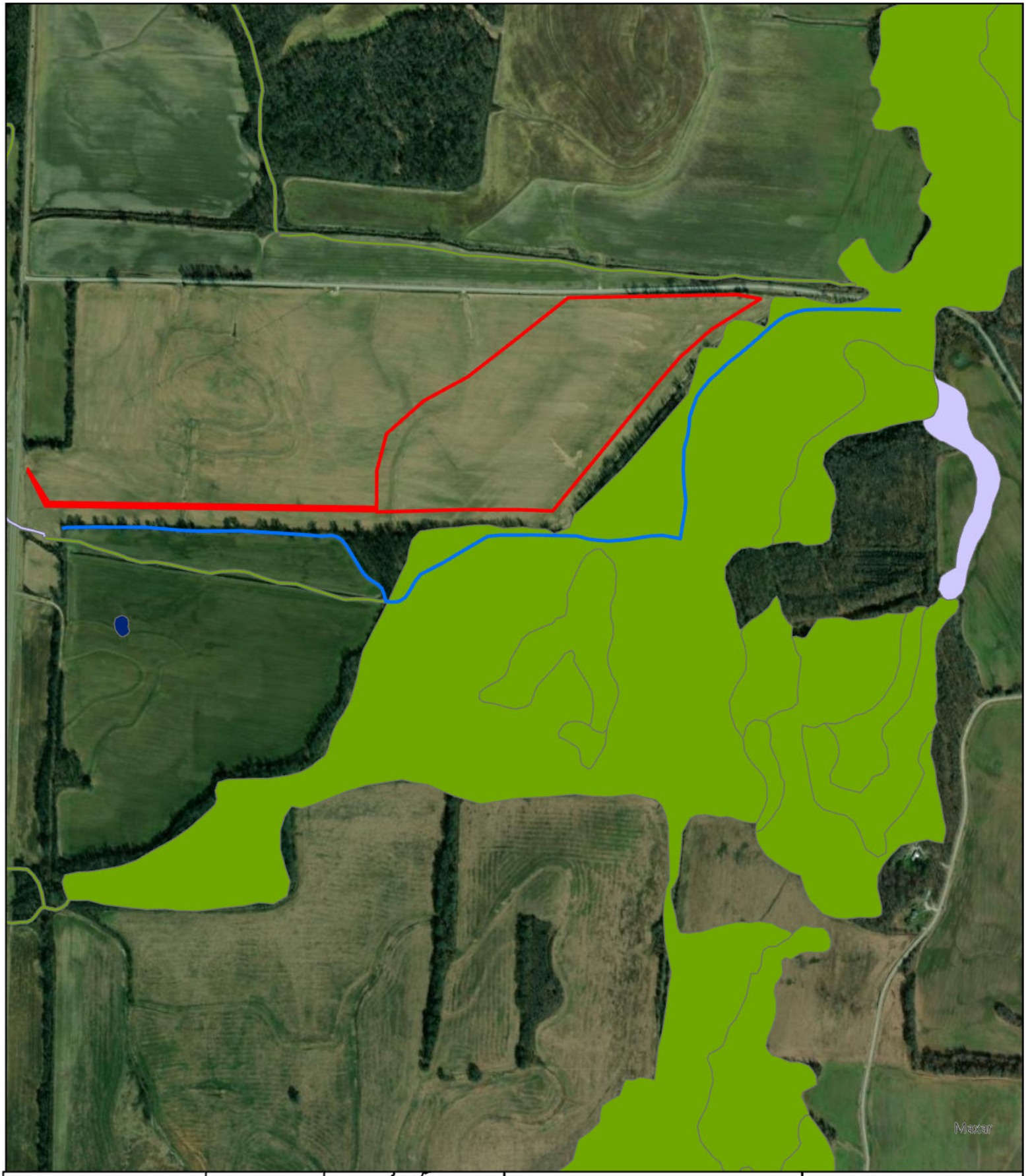
TDOT Design Build DB2301
SR-222 N-Ford Construction
Haywood County, TN

Project Number:	Drafted/Checked by:	Date:
23391	CS	2/15/2024

Legend

- Waste Pit
- Stream
- Roads

Path: C:\Users\cslone1\OneDrive - Bacon Farmer Workman\Documents\ArcGIS\Projects\TOPO TEST\TOPO TEST.aprx



BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

N

0 250 500 1,000 1,500 2,000 ft

1 inch: 1,000 Feet

Figure 2 - NWI TDOT Waste Site

TDOT Design Build DB2301
SR-222 N-Ford Construction
Haywood County, TN

Project Number:	Drafted/Checked by:	Date:
23391	CS	2/15/2024

Legend

- Waste Site
- Pond
- Stream
- Haul Road
- Forested/Shrub Wetland
- Emergent Wetland

8. SOIL SURVEY INFORMATION

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Haywood County, Tennessee

Waste Site for SR-222

April 11, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

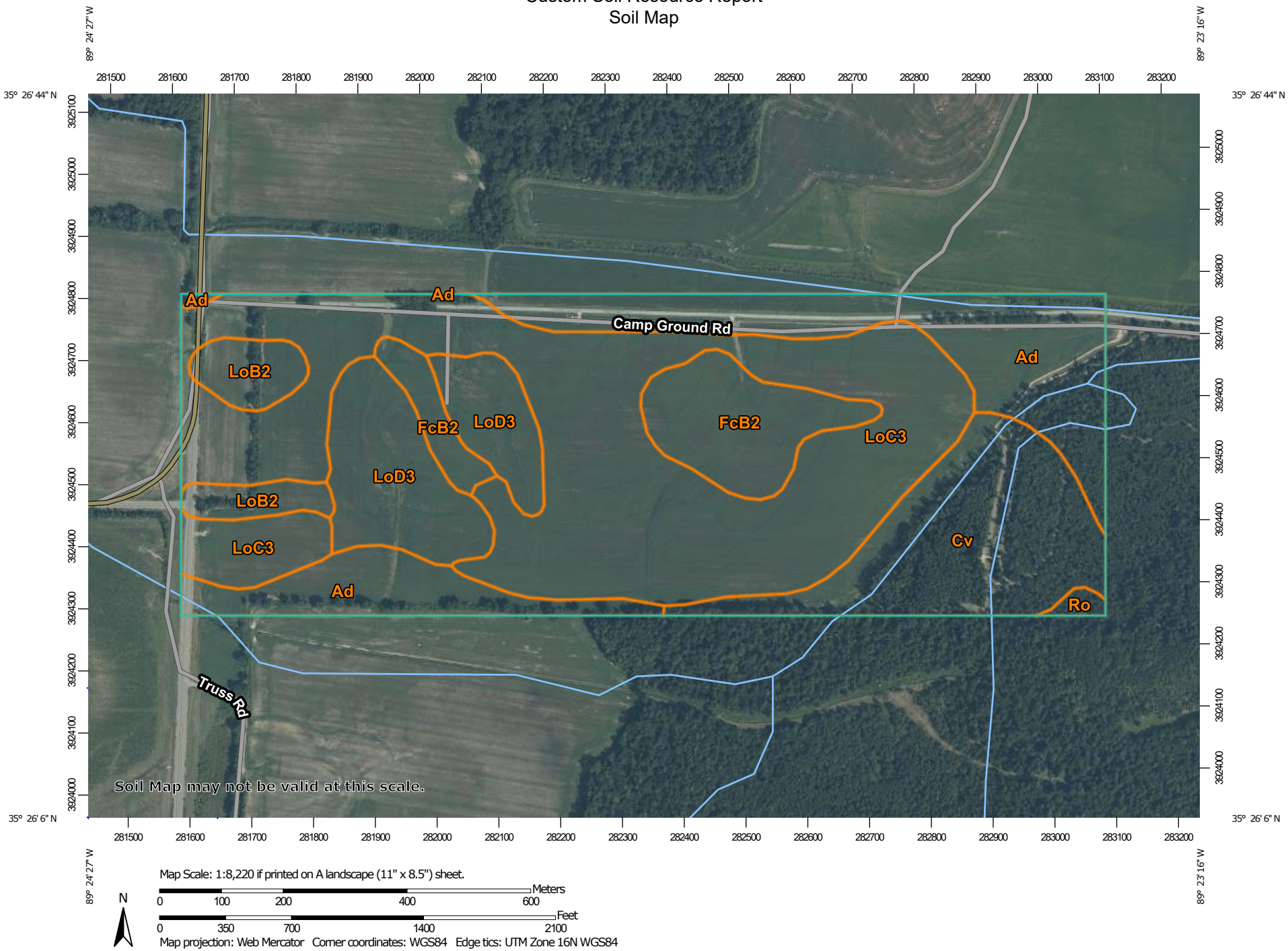
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:8,220 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Haywood County, Tennessee
Survey Area Data: Version 23, Sep 12, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 9, 2019—Sep 15, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ad	Adler silt loam, 0 to 2 percent slopes, frequently flooded	37.3	19.4%
Cv	Convent silt loam, frequently flooded	26.4	13.7%
FcB2	Feliciana silt loam, 2 to 5 percent slopes, moderately eroded, northern phase	16.3	8.5%
LoB2	Loring silt loam, 1 to 5 percent slopes, eroded	7.4	3.9%
LoC3	Loring silt loam, 5 to 8 percent slopes, severely eroded	83.3	43.3%
LoD3	Loring silt loam, 8 to 12 percent slopes, severely eroded	20.7	10.8%
Ro	Routon silt loam	0.8	0.4%
Totals for Area of Interest		**192.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit

descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Haywood County, Tennessee

Ad—Adler silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2zdd9
Elevation: 180 to 500 feet
Mean annual precipitation: 50 to 53 inches
Mean annual air temperature: 47 to 71 degrees F
Frost-free period: 175 to 303 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Adler, frequently flooded, and similar soils: 89 percent
Minor components: 11 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Adler, Frequently Flooded

Setting

Landform: Alluvial fans, flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 5 inches: silt loam
Bw - 5 to 23 inches: silt loam
C - 23 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 8 to 36 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 13.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F134XY014AL - Northern Non-Acid Floodplain - PROVISIONAL
Hydric soil rating: No

Minor Components

Morganfield, frequently flooded

Percent of map unit: 7 percent
Landform: Alluvial fans, flood plains

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Ecological site: F134XY014AL - Northern Non-Acid Floodplain - PROVISIONAL
Hydric soil rating: No

Convent, frequently flooded

Percent of map unit: 4 percent
Landform: Natural levees
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F134XY015AL - Northern Non-Acid Moderately Wet Floodplain - PROVISIONAL
Hydric soil rating: No

Cv—Convent silt loam, frequently flooded

Map Unit Setting

National map unit symbol: m12n
Elevation: 20 to 150 feet
Mean annual precipitation: 45 to 61 inches
Mean annual air temperature: 50 to 70 degrees F
Frost-free period: 206 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Convent and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Convent

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Parent material: Silty alluvium

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 48 inches
Frequency of flooding: Frequent
Frequency of ponding: None

Available water supply, 0 to 60 inches: Very high (about 13.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C
Ecological site: F134XY015AL - Northern Non-Acid Moderately Wet Floodplain - PROVISIONAL
Hydric soil rating: No

FcB2—Feliciana silt loam, 2 to 5 percent slopes, moderately eroded, northern phase

Map Unit Setting

National map unit symbol: 2y71v
Elevation: 300 to 540 feet
Mean annual precipitation: 49 to 55 inches
Mean annual air temperature: 46 to 72 degrees F
Frost-free period: 190 to 245 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Feliciana, northern phase, and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Feliciana, Northern Phase

Setting

Landform: Divides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-silty noncalcareous loess

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 25 inches: silty clay loam
Bt2 - 25 to 41 inches: silt loam
Bt3 - 41 to 60 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F134XY003AL - Northern Loess Interfluve - PROVISIONAL
Hydric soil rating: No

Minor Components

Loring, northern phase

Percent of map unit: 6 percent
Landform: Loess hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F134XY012AL - Northern Loess Fragipan Upland - PROVISIONAL
Hydric soil rating: No

LoB2—Loring silt loam, 1 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: m136
Elevation: 280 to 460 feet
Mean annual precipitation: 45 to 61 inches
Mean annual air temperature: 50 to 70 degrees F
Frost-free period: 206 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Loring and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Loring

Setting

Landform: Loess hills
Landform position (three-dimensional): Crest
Parent material: Loess

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 26 inches: silt loam
H3 - 26 to 57 inches: silt loam
H4 - 57 to 60 inches: silt loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: 14 to 35 inches to fragipan

Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 11 to 29 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F134XY012AL - Northern Loess Fragipan Upland - PROVISIONAL
Hydric soil rating: No

LoC3—Loring silt loam, 5 to 8 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: 2v7sk
Elevation: 280 to 490 feet
Mean annual precipitation: 35 to 63 inches
Mean annual air temperature: 47 to 71 degrees F
Frost-free period: 189 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Loring and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Loring

Setting
Landform: Loess hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loess

Typical profile
Ap - 0 to 5 inches: silt loam
Bt - 5 to 20 inches: silt loam
Btx - 20 to 65 inches: silt loam

Properties and qualities
Slope: 5 to 8 percent
Depth to restrictive feature: 14 to 30 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 11 to 14 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F134XY012AL - Northern Loess Fragipan Upland - PROVISIONAL
Hydric soil rating: No

LoD3—Loring silt loam, 8 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2v7sl
Elevation: 280 to 490 feet
Mean annual precipitation: 35 to 63 inches
Mean annual air temperature: 47 to 71 degrees F
Frost-free period: 189 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Loring and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Loring

Setting

Landform: Loess hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 4 inches: silt loam
Bt - 4 to 20 inches: silt loam
Btx - 20 to 60 inches: silt loam
C - 60 to 79 inches: silt loam

Properties and qualities

Slope: 8 to 12 percent
Depth to restrictive feature: 14 to 30 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 12 to 33 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: F134XY012AL - Northern Loess Fragipan Upland - PROVISIONAL
Hydric soil rating: No

Ro—Routon silt loam

Map Unit Setting

National map unit symbol: m13v
Elevation: 260 to 460 feet
Mean annual precipitation: 45 to 61 inches
Mean annual air temperature: 50 to 70 degrees F
Frost-free period: 206 to 220 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Routon and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Routon

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Parent material: Loess over silty alluvium

Typical profile

H1 - 0 to 18 inches: silt loam
H2 - 18 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 12.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F134XY005AL - Northern Wet Loess Interfluve - PROVISIONAL, F134XY010AL - Northern Wet Loess Terrace - PROVISIONAL
Hydric soil rating: Yes

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9. EROSION PREVENTION AND SEDIMENT CONTROL PLAN

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST	2024	R4S222-S1-002	00

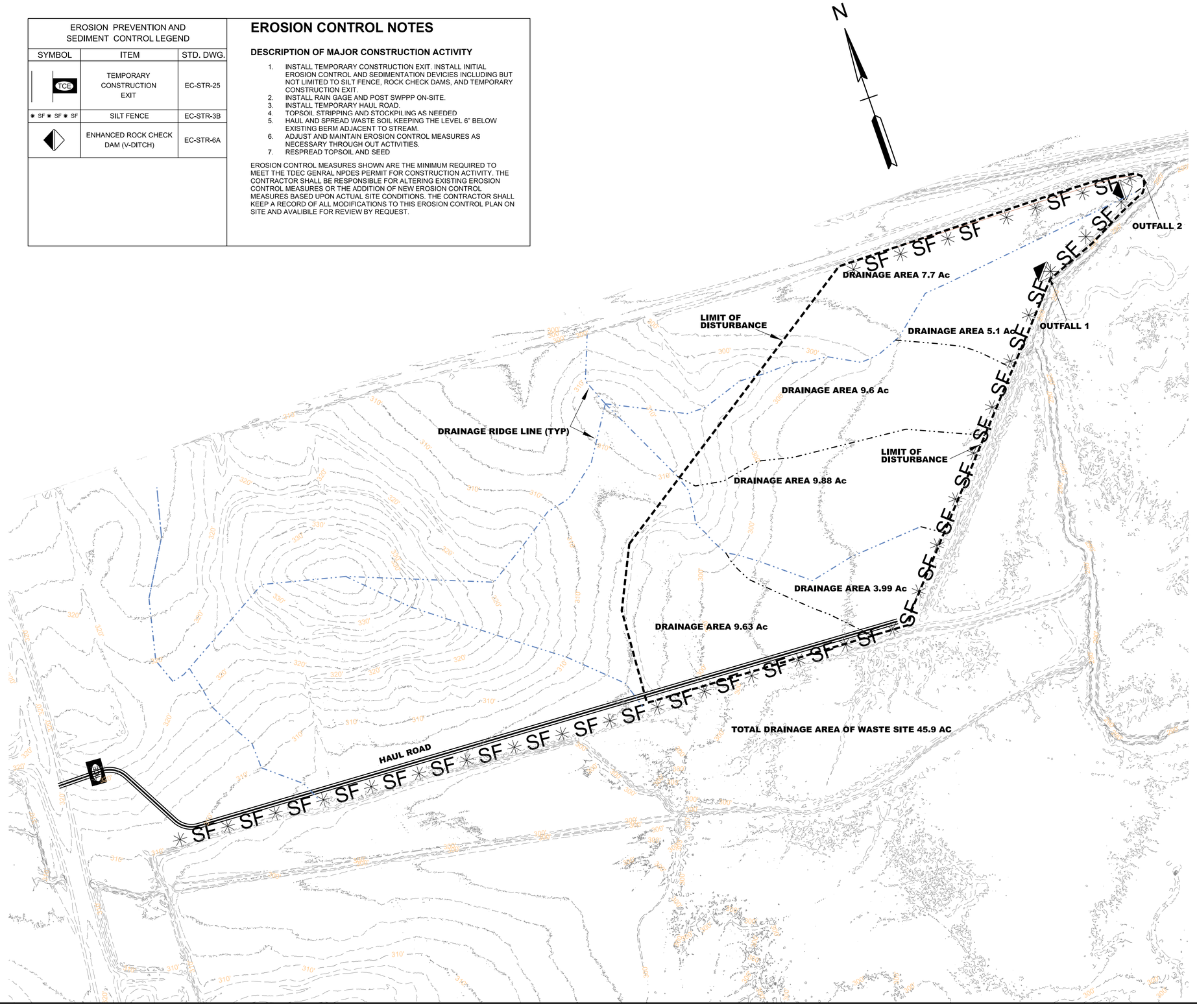
EROSION PREVENTION AND SEDIMENT CONTROL LEGEND		
SYMBOL	ITEM	STD. DWG.
TCE	TEMPORARY CONSTRUCTION EXIT	EC-STR-25
SF SF SF SF	SILT FENCE	EC-STR-3B
	ENHANCED ROCK CHECK DAM (V-DITCH)	EC-STR-6A

EROSION CONTROL NOTES

DESCRIPTION OF MAJOR CONSTRUCTION ACTIVITY

1. INSTALL TEMPORARY CONSTRUCTION EXIT. INSTALL INITIAL EROSION CONTROL AND SEDIMENTATION DEVICIES INCLUDING BUT NOT LIMITED TO SILT FENCE, ROCK CHECK DAMS, AND TEMPORARY CONSTRUCTION EXIT.
2. INSTALL RAIN GAGE AND POST SWPPP ON-SITE.
3. INSTALL TEMPORARY HAUL ROAD.
4. TOPSOIL STRIPPING AND STOCKPILING AS NEEDED
5. HAUL AND SPREAD WASTE SOIL KEEPING THE LEVEL 6" BELOW EXISTING BERM ADJACENT TO STREAM.
6. ADJUST AND MAINTAIN EROSION CONTROL MEASURES AS NECESSARY THROUGH OUT ACTIVITIES.
7. RESPREAD TOPSOIL AND SEED

EROSION CONTROL MEASURES SHOWN ARE THE MINIMUM REQUIRED TO MEET THE TDEC GENRAL NPDES PERMIT FOR CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALTERING EXISTING EROSION CONTROL MEASURES OR THE ADDITION OF NEW EROSION CONTROL MEASURES BASED UPON ACTUAL SITE CONDITIONS. THE CONTRACTOR SHALL KEEP A RECORD OF ALL MODIFICATIONS TO THIS EROSION CONTROL PLAN ON SITE AND AVALIBILE FOR REVIEW BY REQUEST.



SEALED BY

MICHAEL P. McGREGOR — REGISTERED — AGRICULTURE — LANDSCAPE ARCHITECT — No. 122346 — STATE OF TENNESSEE

4-11-2024

COORDINATES ARE NAD 83( ), ARE DATUM ADJUSTED BY THE FACTOR OF AND TIED TO THE TGRN. ALL ELEVATIONS ARE REFERENCED TO THE NAVD 1988 WITH GEOID .

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

EROSION PREVENTION & SEDIMENT CONTROL (EPSC) PLANS

WASTE SITE

SCALE: 1" 200'

4/23/2024 4:03:22 PM
c:\cwatkins pw_workdir\d0179148\Waste Site Plan.dgn

10. BEST MANAGEMENT PRACTICES (BMP'S)

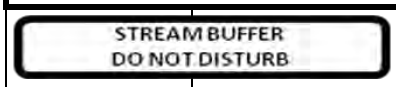
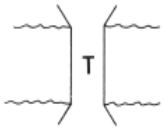
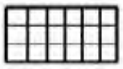
4.0 OVERVIEW OF MANAGEMENT PRACTICES

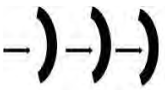
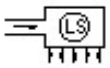
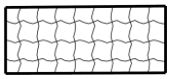
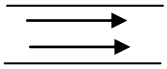
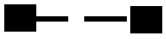
This section covers each management practice in a manner to help the user understand when each practice can or should be used. It should be the first step towards determining which practices should be incorporated into the Stormwater Pollution Prevention Plan (SWPPP). This section does not contain design information and guidance. Section 7 of this manual should be consulted for that information.

4.1 SYMBOLS

The following table contains standard symbols for structural management practices. Note that Site Preparation management practices (Practices 7.1 through 7.5) are a component of the initial site planning and overall site management and therefore do not have specific symbols. Management practices are grouped by management practice category: Site Preparation, Stabilization, Pollution Prevention, Runoff Control and Management, Sediment Control, and Stream Protection Practices.

Table 4.1 Management Practices Symbols

STREAM PROTECTION PRACTICES		**POLLUTION PREVENTION PRACTICES**	
	7.41 Stream Buffers		7.16 Concrete washout
 Stream Diversion Channel			7.17 Vehicle maintenance
	7.43 Temporary Stream Crossing		7.18 Chemical storage
	7.44 Bioengineered Stream Bank Stabilization		7.19 Trash and debris
RUNOFF CONTROL PRACTICES		**STABILIZATION PRACTICES**	
	7.20 Check Dam		7. 6 Disturbed Area Stabilization with straw mulch
	7.21 Dewatering Treatment Practice		7.7 Disturbed area stabilization with other mulches
	7.23 Outlet Protection		7.8 Disturbed Area Stabilization with Permanent Vegetation

	7.24 Slope Drain	SO	7.9 Disturbed Area Stabilization with Sod
	7.25 Tubes and Wattles	TS	7.10 Disturbed Area Stabilization with Temporary Vegetation
	7.26 Level Spreader		7.11 Rolled Erosion Control Products
	7.27 Channels	HYD	7.12 Hydro Applications
SEDIMENT CONTROL PRACTICES		B	7.13 Soil binders and tackifiers
	7.28 Construction Exit	PLAS	7.14 Emergency stabilization with plastic
	7.29 Tire washing facility	SE	7.15 Soil Enhancement
	7.30 Filter Ring	**SEDIMENT CONTROL PRACTICES**	
	7.31 Sediment Basin	CRS	7.36 Construction Road Stabilization
	7.32 Sediment Trap		7.37 Tubes and Wattles (Sediment Control)
	7.33 Baffles	F Berm F Berm F Berm	7.38 Filter berm
	7.34 Silt Fence		7.39 Turbidity curtain
	7.35 Inlet Protection	F	7.40 Flocculants

PRACTICE 7.1: IDENTIFYING SENSITIVE OR CRITICAL AREAS

See Chapter 7, Page 90

Orange safety fencing was used as a visual marker to keep construction activity out of a stream buffer.

Purpose and Application. Identifying sensitive areas on a development site in preparation for construction has many benefits, including lowering the cost of the development. Protecting these areas is much more cost effective than replacing or repairing them after they have been impacted by construction.

Description. Before construction begins on the project, locate and visually mark sensitive areas such as streams and Aquatic Resources Alteration Permit boundaries, buffers, wetlands, sinkholes, caves, critical habitat, and historical areas. Markers can include brightly colored flagging or barrier fencing but should be different from other construction marking and flagging. Areas that pose certain neighborhood danger should also be marked such as sediment ponds.

Limitations Local requirements for tree protection may be more stringent than orange construction fencing such as requiring chain link fence.

Maintenance. Whatever method is chosen to identify sensitive or critical areas must be maintained to ensure the measures remain in good repair and visible. This is especially important when there are multiple subcontractors on a project which may be otherwise unaware of the sensitive or critical areas.

PRACTICE 7.2: CONSTRUCTION SEQUENCING

See Chapter 7, Page 93

The construction sequence noted that fill slopes were to be stabilized as construction above the slopes continued.

Purpose and Application. Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of minimizing erosion and controlling sediment during construction. The removal of surface ground cover leaves a site vulnerable to accelerated erosion. Construction procedures that limit land clearing, provide the timely installation of erosion and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

Description. The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures planned for a project. The construction schedule must be included in the SWPPP and be modified in the field as site conditions change. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

TN Requirements. There may be specific sequencing requirements such as the time of year that clearing can occur on a project due to the presence of endangered or threatened species.

Limitations. Construction sequencing is done on every project to some degree by necessity due to the various trades that may be employed to construct a project. Erosion prevention and sediment control needs to be a factor considered in the construction schedule while balancing other scheduling demands. For example, a clearing contractor may want to make one trip to a project to clear the entire area even though active grading may progress more slowly resulting in cleared areas that will be subject to erosion for a long period of time placing a greater demand on sediment control measures.

Maintenance. Revising the construction schedule to continually consider the erosion prevention and sediment control factor along with the other competing factors such as weather, subcontractor availability, coordination of different trades, etc. is essential.

PRACTICE 7.3: TOPSOILING

See Chapter 7, Page 95

The contractor applied topsoil over the cut slope before applying seed and mulch.

Purpose and Application. Topsoil provides the major zone for root development and biological activities for plants, and should be stockpiled and spread wherever and whenever (i.e. in a timely manner) practical for establishing permanent vegetation.

Description. Topsoiling is a common practice where ornamental plants or high maintenance turf will be grown. It may also be required to establish vegetation on shallow soils, soils containing potentially toxic materials, very stony areas, and soils of critically low pH.

Advantages of topsoil include higher organic matter, more friable consistency, and greater available water-holding capacity and nutrient content. In addition, infiltration can be enhanced by re-spreading topsoil in areas that have been disturbed by construction activity. In some cases, however, handling costs may be too high to make this practice cost-effective. In site planning, the option of topsoiling should be compared with that of preparing a suitable seedbed in the existing subsoil.

Limitations. Do not place topsoil on slopes steeper than 2:1 without additional engineered slope stabilization practices to avoid slippage.

Maintenance. Establishment of vegetation as soon as possible after spreading topsoil is essential for preventing erosion of the topsoil.

PRACTICE 7.4: TREE PRESERVATION

See Chapter 7, Page 98

The contractor installed chain-link fence around the "drip line" of the trees prior to construction.

Purpose and Application. Preserving and protecting trees can often result in a more stable and aesthetically pleasing site. Trees stabilize the soil and help prevent erosion, decrease storm water runoff, moderate temperature, provide buffers and screens, filter pollutants from the air, supply oxygen, provide habitat for wildlife, and increase property values.

Description. Some desirable characteristics to consider in selecting trees to be protected include: tree vigor, tree species, tree age, tree size and shape, tree location, and use as wildlife food source. Trees on stream banks may be required to be protected if they are located in a regulated stream buffer area.
Construction activities are likely to injure or kill trees unless adequate protective measures are taken close to the trees. Direct contact by equipment is the most obvious problem, but damage is also caused by root zone stress from filling, excavating, or compacting too close to trees. Trees to be saved should be clearly marked so that no construction activity will take place within the "drip line" of the tree.

Limitations. Isolating the areas around trees may severely limit the available land at a construction site and may require special planning by the contractor to access some parts of the project.

Maintenance. Tree preservation methods must be maintained to ensure the measures remain in good repair and visible. This is especially important when there are multiple subcontractors on a project which may be otherwise unaware of the sensitive or critical areas.

PRACTICE 7.5: SURFACE TRACKING

See Chapter 7, Page 102

This slope has been tracked, seed applied and then mulched. Tracking helps control erosion, hold seed in place, and aids uniform vegetation germination.

Purpose and Application. Roughening a sloping bare soil surface with horizontal depressions helps control erosion by aiding the establishment of vegetative cover with seed, reducing runoff velocity, and increasing infiltration. The depressions also trap sediment on the face of the slope.

Description. Tracking is typically performed with a bulldozer, working up and down a slope. Tracking should always leave horizontal tracks, as opposed to vertical tracks. Equipment such as bulldozers with rippers or tractors with disks may also be used. The final face of slopes should not be bladed or scraped to give a smooth hard finish.

Limitations. Consider tracking on all slopes. The amount of tracking required depends on the steepness of the slope and the type of soil. Stable rocky faces of a slope may not require tracking or stabilization, while erodible slopes steeper than 3:1 require special surface roughening. This measure needs to be used in conjunction with other practices such as temporary seeding and mulch to prevent erosion and sedimentation.

Maintenance. Seed and mulch should be applied as soon as practicable on a tracked slope.

PRACTICE 7.6: STABILIZATION WITH STRAW MULCH

The cut slopes have been rough graded but not final graded. Straw mulch provides a temporary groundcover that reduces erosion until the final grading can occur.

See Chapter 7, Page 104

MU

Purpose and Application. Surface mulch is the most effective, practical means of controlling erosion on disturbed areas before establishing vegetation. Mulch protects the soil surface, reduces runoff velocity, increases infiltration, slows soil moisture loss, helps prevent soil crusting and sealing, moderates soil temperatures, and improves the microclimate for seed germination.

Description. Organic mulch such as straw is effective for general use where vegetation is to be established. Straw mulch is most effective when it has been anchored with matting, crimping or a tackifier to prevent its movement. In recent years a variety of mats and fabrics have been developed that make effective mulches for use in critical areas such as waterways and channels. Various types of tacking and netting materials are used to anchor organic mulches. Netting is generally not effective when used alone.

TN Requirements. Application of temporary or permanent stabilization must be initiated within 14 days to disturbed areas of a site where construction activities have temporarily or permanently ceased.

Limitations. Mulch is not intended to withstand the shear stress of concentrated flow; therefore, mulching a ditch must be accomplished in conjunction with other velocity reducing measures such as check dams or through the use of an engineered ditch lining material such as a turf reinforcement mat.

Maintenance. Maintenance of a good cover of mulch is one of the most effective erosion prevention measures because it helps prevent movement of the soil thereby reducing the need for sediment control measures. Maintenance of mulch can include but is not limited to applying more mulch where it has blown or washed away, securing the mulch through such actions as crimping or diverting run-on storm water from the mulched area to prevent future wash-outs.

PRACTICE 7.7: STABILIZATION WITH OTHER MULCH MATERIALS

See Chapter 7, Page 107

MO

Shredded wood chip mulch applied 2-3" thick can be used as temporary stabilization

Purpose and Application. Surface mulch is the most effective, practical means of controlling erosion on disturbed areas before establishing vegetation. Mulch protects the soil surface, reduces runoff velocity, increases infiltration, slows soil moisture loss, helps prevent soil crusting and sealing, moderates soil temperatures, and improves the microclimate for seed germination.

Description. There are many types of mulches. Selection of the appropriate type of mulch should be based on the type of application, site conditions, and compatibility with planned or future uses. Besides straw mulch (practice 7.6), other materials can be used as mulches, including wood chips, shredded bark and gravel. Use of onsite materials as mulch is strongly encouraged to reduce the environmental footprint of the site. For example, trees and other vegetation cleared from the site can be ground and used as mulch material for the site.

TN Requirements. Application of temporary or permanent stabilization must be initiated within 14 days to disturbed areas of a site where construction activities have temporarily or permanently ceased.

Limitations. Some mulch materials float when in contact with stormwater runoff and should not be placed in areas receiving concentrated flow. In addition, offsite mulch materials should be certified as free from fire ants. Mulch is not intended to withstand the shear stress of concentrated flow; therefore, mulching a ditch must be accomplished in conjunction with other velocity reducing measures such as check dams or through the use of an engineered ditch lining material such as a turf reinforcement mat.

Maintenance. Maintenance of a good cover of mulch is one of the most effective erosion prevention measures because it helps prevent movement of the soil thereby reducing the need for sediment control measures. Maintenance of mulch can include but is not limited to applying more mulch where it has blown or washed away, securing the mulch through such actions as crimping, or diverting run-on storm water from the mulched area to prevent future wash-outs.

PRACTICE 7.8: TEMPORARY VEGETATION

See Chapter 7, Page 109

TS

A temporary ground cover was applied to this area because final grading was not to occur until spring.

Purpose and Application. Protective cover must be established on all disturbed areas within 14 days after a phase of grading is completed. Temporary seeding and mulching are the most common methods used to meet this requirement. Temporary vegetation is used to protect earthen sediment control practices and to stabilize denuded areas that will not be brought to final grade for several weeks or months. Temporary vegetation can also provide a nurse crop for permanent vegetation, provide residue for soil protection and seedbed preparation, and help prevent dust during construction.

Description. Annual plants that are adapted to site conditions and that sprout and grow rapidly should be used for temporary plantings. Proper seedbed preparation and the use of quality seed are also important.

TN Requirements. Application of temporary or permanent stabilization must be initiated within 14 days to disturbed areas of a site where construction activities have temporarily or permanently ceased.

Limitations. Because temporary seedings provide protective cover for less than one year, areas must be reseeded annually or planted with perennial vegetation.

Maintenance. Generally, the more effort put into proper seedbed preparation, applying appropriate and adequate seed and mulch, and initial watering during germination, the less maintenance needs such as overseeding, reapplying mulch, and extended watering will be required.

PRACTICE 7.9: PERMANENT VEGETATION

See Chapter 7, Page 113

PS

Permanent vegetation is the most effective erosion prevention practice.

Purpose and Application. Permanent vegetation controls erosion by physically protecting a bare soil surface from raindrop impact, flowing water, and wind. Vegetation binds soil particles together with a dense root system and reduces the velocity and volume of overland flow. It is the preferred method of surface stabilization wherever site conditions permit.

Description. Seeding with permanent grasses and legumes is the most common and economical means of establishing a protective cover. The advantages of seeding over other means of establishing plants include the relatively small initial cost, wide variety of grasses and legumes available, lower labor input, and ease of application. Problems to consider are potential for erosion during the establishment period, the need to reseed areas, seasonal limitations on seeding dates, weed competition, and the need for water during germination and early growth. Give special attention to selecting the most suitable plant material for the site and intended purpose. Good seedbed preparation such as topsoiling (see practice 7.3), adequate liming and fertilization, and timely planting and maintenance are also important for good germination and establishment of a permanent groundcover.

TN Requirements. Application of temporary or permanent stabilization must be initiated within 14 days to disturbed areas of a site where construction activities have temporarily or permanently ceased.

Limitations. Establishing permanent vegetation within concentrated flow paths such as swales and ditches will likely require special considerations such as rolled erosion control products (see practice 7.11) to protect the seed and seedbed during (and possibly after) germination.

Maintenance. Generally, the more effort put into proper seedbed preparation, applying appropriate and adequate seed and mulch, and initial watering during germination, the less maintenance needs such as overseeding, reapplying mulch, and extended watering will be required.

PRACTICE 7.10: SOD

See Chapter 7, Page 122

SO

Sod is a fast and effective method of stabilizing bare soils.

Purpose and Application. Sodding provides an immediate and effective groundcover. It allows the use of vegetation to protect channels, spillways, and drop inlets where design flow velocities may reach the maximum allowable for the type of vegetation to be used. Sod is preferable to seed in waterways and swales because of the immediate protection of the channel after application. The installation of sod should also be considered in locations where a specific plant material cannot be established by seed or when immediate use is desired for aesthetics such as landscaping. Some additional advantages of sod are nearly year-round establishment capability, less chance of failure, freedom from weeds, and immediate protection of steep slopes.

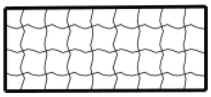
Description. Sod consists of grass or other vegetation-covered surface soil held together by matted roots.

Limitations. Disadvantages include high installation costs, especially on large areas, and the necessity for irrigation in the early weeks. Sod also requires careful handling and is sensitive to transport and storage conditions.

Maintenance. Soil preparation, installation, and proper maintenance are as important with sod as with seed. Choosing the appropriate type of sod for site conditions and intended use is of utmost importance. Sod may need to be pinned in place on steep slopes and in channel applications.

PRACTICE 7.11: ROLLED EROSION CONTROL PRODUCTS

See Chapter 7, Page 126



Turf reinforcement mats are appropriate where concentrated flows exceed the design sheer stress for the channel. (source: NCSU)

Purpose and Application. Rolled erosion control products (RECPs) hold seed in good contact with the soil to promote seed germination and soil stabilization.

Description. These products are temporary degradable or long-term nondegradable material manufactured or fabricated into rolls designed to reduce soil erosion and assist in the growth, establishment and protection of vegetation. Use RECP's to help permanent vegetative stabilization of slopes 2:1 or greater and with more than 10 feet of vertical relief, as well as, channels when sheer stress in the channel exceeds the allowable sheer stress for the 2 year storm event.

Limitations. Installation is critical to the effectiveness of these products. When close ground contact is not properly achieved, runoff can concentrate under the product causing significant erosion.

Maintenance. Monitor the products on a regular basis to avoid significant problems caused by rainfall and high flows.

PRACTICE 7.12: HYDRO APPLICATIONS

See Chapter 7, Page 129

HYD

Hydraulically applied seed, mulch and binder

Purpose and Application. Hydro applications such as hydroseeding and bonded fiber matrices (BFM) are an economical means of applying and securing seed. Its greatest applications are on steep slopes with limited equipment access or on flat terrain where there will be very limited sheet flows.

Description. BFMs contain fibers joined together by adhesive and mineral binders to create a continuous, three dimensional erosion control blanket, which adheres to the soil surface. Hydroseeding materials typically consist of a slurry of seed, fertilizer, mulch, and a tackifier.

Limitations. Hydraulic mulch applications do not provide erosion protection on slopes generally greater than 4:1 or 5:1. However, BFM can be applied on steeper slopes effectively. Failure of either material is typically due to low application rates or improper mixing of materials.

Maintenance. Ensuring that adequate coverage of the slurry is applied is critical; otherwise, maintenance needs such as reapplication or supplementing with other forms of temporary or permanent stabilization will increase.

PRACTICE 7.13: SOIL BINDERS AND TACKIFIERS

See Chapter 7, Page 131

A soil binder is sprayed over a bare soil surface that has been properly tracked (see practice 7.5).

Purpose and Application. Soil binders are materials that are typically used alone to provide erosion control and surface protection for exposed soils. In general, soil binding materials do not provide the microclimatic modification that is provided by mulches or blankets and therefore do not have the same successful germination that mulches provide. They work by binding the upper layer of soil together, forming a crust on the surface so that soil particles resist being suspended in surface flows. Although they form a surface crust, most of the materials do not seal the surface to the point where infiltration is prevented, so they do not prevent the establishment of vegetation.

Description. Tackifiers are materials used to bind mulches together to achieve better adhesion of materials to the soil. When straw or hay mulch is spread, it must either be crimped or bound together with a tackifier to keep it from blowing away or migrating down the slope. The tacking material must be applied uniformly over the surface of the mulch or soil. The result of a properly applied tackifier is a continuous and connected blanket of mulch and tackifier.

TN Requirements. Application of temporary or permanent stabilization must be initiated within 14 days to disturbed areas of a site where construction activities have temporarily or permanently ceased.

Limitations. Soil binders are temporary and must be re-applied after exposure to rain.

Maintenance. Soil binders or tackifiers need to be re-applied after exposure to rain if these measures continue to be necessary because construction activities have ceased temporarily.

PRACTICE 7.14: EMERGENCY STABILIZATION WITH PLASTIC

Temporary covering was used to protect the topsoil stockpile from erosion.

See Chapter 7, Page 137

PLAS

Purpose and Application. Exposed slopes are common around box culvert construction, utility work and stockpile areas. Often, temporary seeding of these areas is not feasible due to the slope or activity on or around them. In situations where soils are exposed and in close proximity to receiving streams, plastic sheeting can provide a temporary ground cover that prevents erosion and off site sediment discharges.

Description. Plastic sheeting must be anchored or held in place to prevent the material from moving. Rocks or other weight can be placed on the sheeting or the sheeting can be trenched in at the top and toe of the slope.

Limitations. Plastic sheeting is a very short term practice for use on exposed slopes in close proximity to streams or wetlands.

Maintenance. Plastic sheeting should be replaced when torn, and care should be taken when overlapping sections of plastic by doing so in a shingle fashion to shed storm water.

PRACTICE 7.15: SOIL ENHANCEMENT

See Chapter 7, Page 139

SE

Development practices often lead to compacted soils, drought sensitive lawns, and high storm runoff contributing to downstream flooding.

Purpose and Application. Soil enhancement refers to techniques employed at a construction project that can enhance infiltration and establishment of a permanent groundcover. Any portion of a construction site that has been graded can benefit from soil enhancement techniques.

Description. Soil enhancement includes the addition of materials to promote vegetative establishment and infiltration. Urban areas are plagued with drainage problems caused, in part, by poor soil management practices at new development sites. Removing the existing vegetation and disturbing and compacting soils is inherent to construction. When disturbance is unavoidable, several techniques can be employed at a site to reverse at least a portion of the damage caused to the soil structure and to increase infiltration. Those techniques include preserving and redistributing topsoil over disturbed areas, deeply tilling disturbed soils to break any crusted or hard panned soils, adding organic matter such as compost to the top 6 inches of soil, reintroducing soil biota, adjusting soil fertility to support vegetation, and planting deep rooted vegetation.

Limitations. These techniques must be used in conjunction with other techniques, such as rolled erosion control products, seed and mulch, to establish a permanent vegetative cover.

Maintenance. Continue to maintain sediment controls down gradient from areas where soil enhancement techniques are being employed. Repair erosion rills early to avoid reapplication or reworking areas where soil enhancement has been applied.

PRACTICE 7.16: CONCRETE WASHOUT

Concrete washout areas should be provided on each construction site where concrete work occurs.

See Chapter 7, Page 142

Purpose and Application. Concrete washout areas are areas on a construction site designated for concrete trucks and other equipment to clean liquid or slurry concrete off the equipment without causing stormwater pollution. When washout areas are used, the slurry is given time to harden and then can be removed without discharging pollutants from the project.

Description. Concrete is a very common building material which is used in road and street construction, drainage structures, retaining walls, footings and foundations, building construction and many other applications. Concrete slurry has the potential to pollute storm water runoff, especially when washout occurs next to natural drainage channels or storm drain inlets. Concrete is most harmful to streams in the slurry form, though once hardened, it can cause blockage of storm drain systems and severely reduce the capacity of the storm drain system or waters of the state. Designated locations for concrete washout should be provided with clearly visible signage on each construction site. Concrete washout areas can be constructed above ground or below ground. They include a storage area lined with a geotextile fabric to allow infiltration of water while preventing the discharge of solids. Some liners are impermeable and rely on evaporation and concrete hardening to remove the liquid. Once the concrete has hardened, it can be busted up and removed from the project.

TN requirements. Measures must be contained in the SWPPP and reflected in the field to control construction related wastes, such as concrete slurry, and prevent the discharge of pollutants from the site.

Limitations. Do not locate concrete washout areas close to streams, sinkholes, wetlands or other sensitive features.

Maintenance. Remove concrete once hardened to ensure there is storage for additional concrete washout. Inspect the liner for rips and replace when necessary.

PRACTICE 7.17: VEHICLE MAINTENANCE

See Chapter 7, Page 145

When fuel or lubricants are stored on a construction project, measures must be taken to prevent spills from causing storm water pollution. No measures were taken around the tanks above.

Purpose and Application. Materials used to maintain and service vehicles onsite can mix with stormwater and discharge pollutants off the construction project and into waters of the state. Where solvents, fuels and other chemicals are stored on a project, precautions must be taken to prevent pollutant discharge.

Description. Equipment on construction sites may need maintenance during the life of the project. It is preferable for equipment to be serviced and maintained off the construction project in a location that has a treatment system in place to prevent pollutant discharges such as oil or vehicle spills. However, offsite maintenance may not be an option. Maintenance activities on construction equipment or vehicles on the construction project require specific attention to potential sources of pollution, such as fuel and lubricant drums. These materials must be handled and disposed of in a manner that prevents the material from mixing with stormwater and discharging into the storm drain system or waters of the state.

Use controls such as drip pans and containment barriers when maintenance activities occur on a project to prevent stormwater contamination. If maintenance activities require fuel and lubricant storage tanks to be stored on the project, secondary containment or weatherproof covers must be provided to prevent spills. Designate an area for vehicle maintenance and keep spill containment and cleanup materials at this location.

Limitations. Where spills have occurred and soils are saturated, contact TDEC's EFO. Soils may have to be excavated and treated or disposed of offsite.

Maintenance. Watch for signs that construction equipment needs maintenance, such as soil staining from oils and lubricants, and have equipment repaired to prevent discharges.

PRACTICE 7.18: CHEMICAL STORAGE

Pouring chemicals into storm drains causes an illicit discharge of pollutants that ultimately reach waters of the state.

See Chapter 7, Page 147

Purpose and Application. Proper storage and disposal of chemicals on a construction site prevents or reduces the discharge of pollutants to stormwater from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials.

Description. Accidental releases of materials from aboveground liquid storage tanks, drums, dumpsters, or other containers have the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from storage containers and dumpsters may accumulate in soils or on the surfaces and be carried away by stormwater runoff into waters of the state. Chemicals stored on a construction site should be stored in a weatherproof building or container. Other options include storing chemicals within a containment system. Store chemicals in a centralized location. Keep spill containment and cleanup materials at the chemical storage area. Do not washout or pour leftover chemicals into the storm drain system.

Limitations. Specific spill containment and clean up procedures should be developed for each site, based upon the materials being stored. Use MSDS sheets provided with the chemicals for guidance on storage, cleanup and disposal.

Maintenance. Ensure all employees and subcontractors on the construction project have been trained on the proper use, storage and disposal of the chemicals.

PRACTICE 7.19: TRASH AND DEBRIS MANAGEMENT

See Chapter 7, Page 149

DEBRIS MANAGEMENT

Construction material waste and trash should be isolated and managed in designated areas to prevent offsite damage and pollution.

Purpose and Application. Construction inherently produces waste materials, including building waste debris, employee-generated trash, waste concrete and asphalt. These materials can mix with stormwater and discharge off the construction site.

Description. Designated waste management areas should be identified throughout the construction project, separating trash from reusable or recyclable materials. Materials prone to leaching should be stored in covered dumpsters. All materials should be stored in a manner to prevent wind from blowing the material off site.

TN Requirements. The Construction General Permit states that the SWPPP shall include a description of controls used to reduce pollutants from materials stored on site, including storage practices to minimize exposure of the materials to storm water, and spill prevention and response.

Limitations. Locate trash and debris stockpile areas away from streams, storm drains, sinkholes and other sensitive features.

Maintenance. Ensure that any debris containment measures are in good working condition. Pick up and dispose of trash located throughout the project. Educate employees and contractors about the proper disposal of all waste.

PRACTICE 7.20: CHECK DAM

See Chapter 7, Page 152

Check dams can be used to reduce velocities in channels to aid in permanent stabilization. (source: NCSU)

Purpose and Application. Check dams are structures installed in channels to reduce velocities and erosion. Check dams also provide some sediment control benefit. Check dams may be installed to reduce velocity in small temporary channels that are degrading, but where permanent stabilization is impractical due to their short period of usefulness; or to reduce velocity in small eroding channels where construction delays or weather conditions prevent timely installation of non-erosive liners.

Description. A check dam is a small, temporary structure constructed across a drainageway (not a stream). Most check dams are constructed of rip rap. However, other manufactured check dam devices are available. Check dams must contain a center spillway section that is lower than the check dam sides. When rip rap is used, geotextile or filter fabric must be installed at the soil-rock interface. Place washed stone on the face of the rip rap check dam.

Limitations. The drainage area is limited to 5 acres maximum. Problems with check dams typically occur at the abutments when the sides are lower than the middle spillway, causing erosion around the abutments. Erosion can also occur at the downstream toe of the check dam. These measures must be monitored and sediment cleaned out from behind the structures to prevent overtopping and failure. In addition, ponding behind the structures must not cause a traffic hazard.

Maintenance. Sediment should be cleaned out from behind check dams when 50% of the storage capacity has been filled with sediment. Particular attention must be given to check dam abutments and the downstream toe, as these areas are susceptible to erosion.

PRACTICE 7.21: DEWATERING TREATMENT PRACTICE

Dewatering structures are often needed when working in a stream on the construction of box culverts.

See Chapter 7, Page 155

Purpose and Application. Dewatering treatment practices treat water that is pumped from excavations into the treatment areas. Treatment can include filtering, chemical flocculation, or settling of sediments prior to discharging stormwater. Dewatering treatment practices are typically necessary in conjunction with utility work and instream construction activities such as box culvert, pipe or bridge construction.

Description. Dewatering treatment practices are temporary practices that include manufactured and non-manufactured products. Where fine clay soils are present in stormwater runoff, chemical treatment with flocculants may be necessary. These practices must be identified and sited during SWPPP preparation to ensure that there is room for the practice and that the practice can be maintained while in use.

Limitations. Problems with dewatering structures typically occur when the pump discharges a higher volume of water than the structure can handle or when the structure is not maintained. Removal and disposal of geotextile bags, like the one shown above, can also cause problems if overfilled or located too close to a stream.

Maintenance. Ensure that the treatment practice is either cleaned out or removed once the storage is full. Visually verify that discharges from the treatment practices are not turbid. Filter bag removal method must be considered before relying on a filter bag for dewatering treatment.

PRACTICE 7.22: DIVERSION

See Chapter 7, Page 160

TD

Diversions convey stormwater around or through a site. They can be temporary or permanent measures.

Purpose and Application. Diversions carry runoff around a construction area; to reduce slope length and minimize erosion; or to carry sediment laden runoff to a treatment practice. They can be designed as temporary or permanent measures and must be stabilized accordingly.

Description. Diversions can be created through excavation or by building a ridge. This practice applies to construction areas where runoff can be diverted and disposed of properly to control erosion, sedimentation, or flood damage. Specific locations and conditions include above disturbed existing slopes, and above cut or fill slopes to prevent runoff over the slope; across unprotected slopes, as slope breaks, to reduce slope length; below slopes to divert excess runoff to stabilized outlets; where needed to divert sediment-laden water to sediment traps; at or near the perimeter of the construction area to keep sediment from leaving the site; and above disturbed areas before stabilization to prevent erosion, and maintain acceptable working conditions. Temporary diversions may also serve as sediment traps when the site has been over excavated on a flat grade. They may also be used in conjunction with silt fence.

Limitations. Unless stabilized, diversions can exacerbate erosion prevention and sediment control on a project.

Maintenance. After diversions have been constructed, stabilize them against erosion. Sediment deposits should be removed to prevent overtopping of the diversion. Additional erosion controls, such as check dams, may be necessary to reduce erosion.

PRACTICE 7.23: OUTLET PROTECTION

See Chapter 7, Page 165

Outlet protection is necessary at the outlets of pipes, ditches and other conveyances where sheer stress exceeds the allowable sheer stress for grass-lined channels.

Purpose and Application. Outlet protection provides permanent stabilization for the material at the outlet of the pipe, channel or other conveyance system. Outlet protection is also needed at outlets to temporary slope drains to prevent scour while the slope drain is in place.

Description. Outlet protection can be constructed of many different types of erosion-resistant materials but must be designed based upon the velocity and sheer stress at the outlet of the conveyance. Rip rap is a common outlet protection material. Outlet protection must be keyed into the existing ground and constructed as close to a zero grade as possible. For rip rap outlet protection, a geotextile underlayment or filter fabric is required to prevent piping.

TN Requirements. Outfall installation and outlet protection at the end of a stream crossing within a stream must always be specifically permitted through the Aquatic Resource Alteration Permit for the culvert or bridge.

Limitations. An often-overlooked consideration in outlet protection installation is the over excavation required to sufficiently key in the riprap. In addition, the size of riprap required to withstand the force of the water exiting the pipe may be prohibitive (i.e. too large) and other methods may need to be considered.

Maintenance. Monitoring for bypassing of the outlet protection and scour of the surrounding area is critical. This is a common problem when the outlet protection has either not been sufficiently keyed into the soil or the outlet protection is not sufficiently wide.

PRACTICE 7.24: SLOPE DRAIN

See Chapter 7, Page 173

The goal of a slope drain is to convey stormwater down a slope to prevent erosion while the slope is being stabilized.

Purpose and Application. Slope drains are temporary measures that are used where sheet or concentrated storm water flow could cause erosion as it moves down the face of a slope to prevent erosion from sheet or concentrated flow on or below the slope. Special attention is needed at entrance, tight joints, pipe anchors, and exit. These structures are removed once the slope has been stabilized and the permanent storm water conveyance system has been installed.

Description. Temporary slope drains consist of flexible tubing or conduit extending from the top to the bottom of a cut or fill slope. Sediment controls are installed at the inlet and erosion controls at the outlet. Prior to installing slopes drains, the slope being protected must be stabilized.

Limitations. The maximum drainage area to any one slope drain is 1 acre.

Maintenance. Stabilize the diversion berm at the top of the slope. Ensure that the slope drain is located in the low point above the slope. Remove sediment from the sediment control practice when 50% of the sediment storage volume has been filled. Ensure that the slope drain has been secured properly to the slope to prevent disconnection of pipe joints. Failure of the slope drains can occur when the anchor berm installed over the slope drain at the top of the slope hasn't been compacted or stabilized.

PRACTICE 7.25: TUBES AND WATTLES

See Chapter 7, Page 177

Wattles are used primarily as a flow interruption device to slow the velocity of storm water runoff across slopes and in roadside ditches and swales.

Purpose and Application. Wattles and tubes may be utilized on slopes or in small ditches to reduce flow velocities. While they are generally used at regular intervals on a slope, they may also be placed at the top or toe of the slope or at breaks in grade.

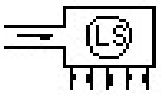
Description. Wattles and tubes consist of flexible tubes of biodegradable netting or geotextile fabric filled with natural fibers, hardwood mulch or other porous material. The filler material must have sufficient density to hold its shape when saturated, but must also have sufficient open space to allow sediment-laden water to pass through. These measures act to slow flow velocities so that sediments being carried in the runoff can drop out. The middle section of the wattle, tube or sock should be lower than the ends to prevent scour around the ends, and they must be securely staked in place. Manufacturer's installation instructions must be followed.

Limitations. Biodegradable wattles and tubes have a limited lifespan and may have to be replaced during the project. Wattles and tubes may have to be stacked to provide adequate erosion control.

Maintenance. Ensure flow is not bypassing the structures and that no evidence of scour is present on the downstream toe. Remove deposited sediments when 50% of the storage height is filled.

PRACTICE 7.26: LEVEL SPREADER

See Chapter 7, Page 180



Level spreaders convert concentrated flow into sheet flow. (Source: NCSU)

Purpose and Application. Level spreaders convert concentrated flow to sheet flow. The most prevalent application of level spreaders is converting concentrated flow into sheet flow before discharging into stream buffers.

Description. Level spreaders can be constructed out of many different materials. They consist of a conveyance (a channel or diversion), energy dissipation, a ponding area, and a level lip. Stormwater should flow as sheet flow across the level lip. Construct level spreaders in undisturbed soil. The lip must be level to ensure uniform spreading of storm runoff, and the outlet slope uniform to prevent the flow from concentrating. Water containing high sediment loads should enter a sediment trap before release in a level spreader. The drainage area limitation is 5 acres and the spreader must be sized based on design runoff.

Limitations. If the lip of the level spreader is not level, stormwater will re-concentrate and cause erosion.

Maintenance. All areas draining to the level spreader must be stabilized. Sediment and other debris must be removed from the ponding area to prevent bypassing. Repair erosion areas.

PRACTICE 7.27: CHANNEL LININGS

See Chapter 7, Page 184

Stabilized channels convey stormwater non-erosively, encouraging infiltration and filtering runoff.

Purpose and Application. Channels are permanent structures that convey concentrated runoff. Many methods of permanent stabilization are available, including vegetation, vegetation with a permanent liner, rip rap, and concrete.

Description. The preferred channel lining is vegetation. Grass lined channels provide benefits above simply conveying stormwater runoff while maintaining a stable channel. The grass provides some filtering of stormwater after the site has been stabilized. In addition, grass lined channels are typically on gentle slopes with low velocities and promote infiltration. As shear stresses and slopes increase, rolled erosion control products (RECPs) should be incorporated into the channel stabilization design, leaving rip rap and concrete lined channels as the last options for stabilization, only where site conditions will not allow stabilization with grass and a liner (temporary or permanent). Temporary linings should be designed based upon the 2 year storm, while permanent linings are designed based upon the 10 year storm.

Limitations. Channels are designed based upon the 2-year and 10-year storm events. Storms larger than the design storm can cause channel linings to fail.

Maintenance. Once established, grass lined channels are easier to maintain long term than rip rap and concrete lined channels. However, once the channels are temporarily or permanently stabilized, they should be protected from construction activity – particularly runoff with heavy loads of sediment.

PRACTICE 7.28: CONSTRUCTION EXIT

See Chapter 7, Page 205

Rock construction exits should be installed at each location that construction traffic leaves the construction project.

Purpose and Application. Construction exits are temporary sediment control devices installed where ever construction traffic leaves an active construction site. Most often, construction exits are constructed of clean stone. However, several manufactured construction exits are available that do not include stone.

Description. Construction exits reduce or eliminate the transport of sediment from the construction site onto a public right of way. Rock construction exits should be constructed with 2"-3" sized clean stone, installed at least 6" deep. A geotextile underliner must be installed under the rock to prevent sediment from piping up through the rock from the underlying soil surface. In addition, the geotextile fabric underliner makes maintenance of construction exists easier. The rock construction entrance should extend the full width of the entrance area, sufficiently long for vehicles to drop mud and sediment and stable enough for construction traffic. Avoid entrances on steep grades or at curves in public roads. Stormwater must be properly managed around the construction exit to prevent washing sediment off the construction exit. In situations where a properly installed and maintained construction exit does not adequately clean tires before leaving the construction site, a more robust tire washing facility (see practice 7.29) may be necessary.

Limitations. Soils that contain a high percentage of clay may require a more robust tire washing facility.

Maintenance. When visual inspections note an excessive build up of sediment on the construction exit, the sediment and rock should be removed and replaced with clean stone. Sediment tracked off the construction project must be cleaned up before the next rain event or within 7 days, whichever is shorter.

PRACTICE 7.29: TIRE WASHING FACILITY

See Chapter 7, Page 209

Where tire washing facilities are installed, particular attention should be given to runoff management to prevent sediment from being discharged from the site.

Purpose and Application. Tire washing facilities should be used where rock construction exits do not provide adequate protection from tracking sediment and mud off the construction sites. Sites with high clay content soils may benefit from tire washing facilities. Long term construction projects may also benefit from tire washing facilities.

Description. Several different types of tire washing facilities can be constructed based upon the project longevity and the desire for an active or passive washing facility. Washing facilities can simply be a cattle guard design coupled with a water source and hose with sprayer or more robust such as a pre-fabricated tire washing facility. The washing facility must have provisions for intercepting and treating the sediment-laden wash water and directing it into a deposition area.

Limitations. If using this practice, an adequate source of water must be provided. In addition, the dirty water generated by the washing activity must be directed to a sediment basin or trap to be treated before being discharged. Stormwater runoff and process water handling around the tire washing facility must be adequately addressed in the SWPPP and throughout the life of construction to avoid traffic hazards and the discharge of untreated process water.

Maintenance. When visual inspections note sediment deposition in the wash water treatment practices, sediment must be removed and properly disposed. Sediment tracked off the construction project must be cleaned up before the next rain event or within 7 days, whichever is shorter.

PRACTICE 7.30: FILTER RING

See Chapter 7, Page 212

Filter rings should be part of an overall system of BMPs. Above, the filter ring is providing sediment control while the mulch is providing erosion control.

Purpose and Application. Filter rings are temporary sediment controls, constructed of rip rap and installed at the entrance to storm drains and culverts. To enhance settling, washed stone is placed on the upstream face of the filter ring.

Description. Filter rings include the rock berm and sediment storage area. They are installed at the entrance to storm drains and prevent sediment from entering, accumulating in and being transferred through the culvert or storm drain system. Filter rings are installed with a sediment storage area on the upstream side of the filter ring to aid in sediment deposition. Geotextile fabric is installed at the interface between the rock and soil to prevent piping under the structure.

Limitations. These practices are used at storm drain inlets with large drainage areas or at drop inlets that receive high velocity water flows, possibly from many directions. Sediment is captured in an excavated depression surrounding the inlet. When drainage area exceeds 1 acre, additional measures are necessary. This practice must not divert water away from the storm drain.

Maintenance. Sediment deposits must be cleaned out when half the storage capacity of the sediment deposition area has been filled. **It is important that all stormwater flow over the structure into the storm drain, and not past the structure.** Temporary diking below the structure may be necessary to prevent bypass flow.

PRACTICE 7.31: SEDIMENT BASIN

See Chapter 7, Page 215

A slotted drain pipe has been installed to dewater this basin. Note that discharge doesn't occur from this basin until the water level in the storage area reaches the bottom of the slotted drain pipe.

Purpose and Application. Sediment basins are temporary engineered structures designed to capture sediment from construction site stormwater runoff prior to being discharged.

Description. Sediment basins contain the following components: an embankment, a sediment storage area, a permanent pool, a sediment forebay, a principal and emergency spillway system, outlet protection at the outlet of the spillway barrel, and a dewatering mechanism. Sediment basins are constructed by building a low earthen dam across a drainageway, by excavating a storage area, or by a combination of both to form the sediment storage pool. A properly designed spillway outlet system with adequate freeboard is essential. The embankment should be well compacted and vegetated. A permanent pool of water is required to provide better settling efficiency, and dewatering from the top of the basin pool is required to also aid in settling efficiency.

TN Requirements. For an outfall in a drainage area of a total of 10 or more acres, a temporary sediment basin (or equivalent controls) is required that provides storage and a spillway system for controlling runoff from a 2 year, 24 hour storm for each acre drained. For impaired and high quality waters, sediment basins are required for a drainage area of 5 or more acres, and the basin must be designed to control volume of runoff from a 5 year, 24 hour storm. A permanent pool must be designed into the sediment storage zone. In addition, a sediment forebay is required to aid in maintenance. Discharges from sediment basins cannot cause an objectionable color contrast with the receiving stream.

Limitations. Sediment basins must be designed by an engineer or landscape architect. Basins typically require large areas for adequate settling, as the crucial design component for basins is available sediment storage zone surface area. A 4:1 length to width ratio is required.

Maintenance. Ease of basin cleanout and spoil disposal must be considered in site selection. The forebay decreases the frequency of dredging or cleaning out the sediment storage area in the basin.

PRACTICE 7.32: SEDIMENT TRAP

See Chapter 7, Page 241

Half of the sediment storage volume should be in wet storage or a permanent pool to increase settling efficiency.

Purpose and Application. Sediment traps are temporary ponding areas formed by excavating a sediment storage area and constructing an earthen embankment with a simple rip rap spillway. They serve small drainage areas.

Description. Sediment traps have sediment storage areas, a permanent pool, an embankment, a spillway, and often also have porous baffles. Sediment traps should be constructed as a first step in any land disturbing activity, often in conjunction with diversions and other temporary measures. Geotextile fabric is installed at the interface of the rock spillway and soil. Sediment trap trapping efficiency can be improved by installing one or more baffles in the sediment storage area to remove turbulent flow, increasing the flow length through the measure, or facing the rip rap spillway with washed stone.

Limitations. The drainage area limitation for sediment traps is 5 acres or less of total contributing area. Supplemental stormwater runoff treatment may be necessary for clayey soils to lower the turbidity.

Maintenance. Sediment should be removed when 50% of the storage capacity has been filled with sediment to prevent overtopping and failure of the measure. Access to the sediment trap must be considered in the design and location of traps to facilitate cleanout. Ensure that stormwater doesn't bypass the measure by constructing diversions and/or berms to direct flow into the trap.

PRACTICE 7.33: BAFFLES

See Chapter 7, Page 246

Baffles increase the settling efficiency of sediment traps and basins.

Purpose and Application. Porous barriers installed in sediment basins, sediment traps, or skimmer basins to reduce the velocity and turbulent flow of the water flowing through the structure. Baffles facilitate settling and sediment before discharge.

Description. Baffles are constructed out of porous materials such as jute or coir and installed perpendicular to flow through the practice. Two to three baffles should be installed in each sediment storage area to divide the storage area into deposition zones. Polymers, such as polyacrylamide, can be used in conjunction with baffles to greatly improve settling in the practice.

Limitations. Baffles should not be installed immediately down gradient from pipe outlets. It is essential to install the measure securely to avoid blow outs and other malfunctions. If baffles aren't installed correctly, short-circuiting around the sides or scour along the toe can occur.

Maintenance. The design life of the fabric is 6-12 months, but may need to be replaced more often if clogging occurs. Also, the majority of the settling in the sediment storage area will occur above the first baffle, making clean out of basins and traps easier.

PRACTICE 7.34: SILT FENCE

See Chapter 7, Page 250

Properly installed silt fence provides good sediment control around the perimeter of a construction site.

Purpose and Application. Silt fence is a permeable sediment barrier erected near small disturbed areas to capture sediment from sheet flow. Silt fence reduces the velocity of flow, allows deposition, and retains sediment. Silt fence should be installed along the contour to encourage sheet flow.

Description. Temporary silt fence is composed of woven geotextile fabric supported by steel or hardwood posts, buried at the bottom. The permeability of the fabric is fairly low, so that water can pass through it only slowly. This causes stormwater runoff from disturbed areas to form a pool on the upstream side of the fence so that sediments can settle out, thus preventing them from leaving the construction site. Because silt fence is not designed to withstand high heads, the drainage area must be restricted and the fence located so that water depth does not exceed 1.5 feet at any point. Silt fence may be designed to store all the runoff from the design storm, or located to allow bypass flow when the temporary sediment pool reaches a predetermined level.

Limitations. The maximum drainage area to a section of silt fence is ¼ acre per 100 feet of silt fence. However, as drainage area slopes increase, the treatment capability of silt fence decreases. In addition, silt fence is not allowed in areas of concentrated flows, as flow capacities of the silt fence fabric will be exceeded and the silt fence will fail. Concentrated flow areas include channels and pipe outlets. Where sections of silt fence are joined, these joints can become failure points if the joints are not constructed correctly.

Maintenance. The effectiveness of silt fence is largely dependent on the proper installation and maintenance. Sediment should be removed from behind the silt fence when half the storage depth has been filled. If runoff concentrates along the toe of the silt fence, erosion will occur. J-hooks or stable silt fence outlets should be considered in these areas. Silt fence should be maintained or replaced when it begins to sag, as sagging points typically are points of overtopping and downstream scour. The design life of silt fence fabric is 6-12 months.

PRACTICE 7.35: INLET PROTECTION

See Chapter 7, Page 258

The effectiveness of inlet protection is dependent on routine maintenance.

Purpose and Application. Inlet protection is installed at the entrance to storm drain systems to prevent sediment from construction sites from getting into the storm drain system.

Description. Inlet protection practices can be manufactured devices or can be constructed on the project. All inlet protection devices have the following components: a sediment storage area, a sediment barrier or filter, and a stormwater overflow mechanism to manage larger storm events. Inlet protection measures provide filtration or a temporary detention area to allow settling. Where filtration is the primary means of providing protection careful maintenance of the filter media is essential. Silt fence inlet protection must have bracing installed to prevent inward collapse of the structure.

Limitations. Inlet protection devices can only manage runoff from one acre or less per structure. These devices should be installed as secondary sediment control measures, as their effectiveness is low. Ponding behind inlet protection can cause a traffic hazard, if the device is located near travel lanes. Drop inlets are often in series, and when an upstream measure is bypassed due to clogging or lack of storage, downstream measures will fail as the drainage areas for downstream measures will increase.

Maintenance. If filter fabric gets clogged, significant ponding will occur and the BMP is likely to fail. Replace the filter fabric when evidence of clogging is visually noted. Sediment should be removed when 50% of the sediment storage volume has been filled with sediment or other debris. Diversions and/or berms may be needed to prevent stormwater runoff from bypassing treatment.

PRACTICE 7.36: CONSTRUCTION ROAD STABILIZATION

See Chapter 7, Page 269

CRS

The construction roadway has been stabilized with stone to prevent erosion of the roadbed.

Purpose and Application. Construction road stabilization techniques should be applied to all temporary or permanent construction access routes, haul roads, on-site vehicle transportation routes, and construction parking areas to prevent erosion. This will reduce erosion and subsequent re-grading of permanent roadbeds between time of grading and final stabilization. Unstabilized roadways can generate sediment and/or dust. During wet weather, unstabilized roads can become unusable, causing a delay in construction.

Description. Construction roads and parking areas should be stabilized early in the project. Different types of materials can be used to stabilize these areas; however, gravel and other types of rock are the most prevalent material used for stabilization. If crusher run is used, the fine material in the mix must be managed so it does not contribute to off-site sedimentation or turbidity. Maintain and monitor construction exits when crusher run is used for construction road stabilization (crusher run is NOT allowed for construction exits). Regardless of the material used, controlling surface runoff from the roadway and adjoining areas is a key erosion control consideration.

Limitations. Avoid steep slopes, wet or rocky areas, and highly erosive soils.

Maintenance. Where material migrates off the roadway or wears thin, the construction roadway or parking area may need another application of rock. Topdress with new gravel as needed. Inspect drainage ditches and other areas for evidence of rock and sediment migration from the roadway.

PRACTICE 7.37: TUBES AND WATTLES (SEDIMENT CONTROL)

See Chapter 7, Page 273

Wattles and tubes perform as velocity reduction and sediment reduction practices, and many are biodegradable.

Purpose and Application. Wattles and tubes can be used as velocity reduction or sediment control practices, depending on the application. For this practice, the focus is on sediment control. Their primary sediment control applications are: 1) installed on slopes to slow sheet flow, promote infiltration, trap sediment and reduce runoff volume; 2) installed around storm drain inlets to prevent sediment from migrating into the storm drain system; and 3) installed along the perimeter of a small site with minimal slope to slow sheet flow and promote sediment deposition. These practices can be used in place of silt fence at the perimeter of a small site. They are very good practices to install on a residential lot.

Description. Wattles and tubes have a mesh or netting material around an inner filter media material. Some wattles and socks are fully biodegradable, while others have degradable components. All wattles and tubes must have an intimate contact with the ground to prevent piping under the measure. The ends of wattles and tubes should extend up the sides of channels and ditches when installed in areas of concentrated flow. Design is based upon the primary application as either a velocity control in channels and ditches or as sediment control.

Limitations. Common diameters of these practices are from 8" to 20". Sediment storage area behind these measures is, therefore, limited. Wattles and tubes must be staked down so they can't be installed on pavement or rock.

Maintenance. Depending on the material, these practices can have a very short life span (3-6 months) or a longer life span (12 months or more). The maintenance plan accompanying the EPSC plan should clearly identify the expected life span for the practice being used. An advantage of using biodegradable wattles or socks is realized when construction is complete and measures are being removed. For many wattles and socks with biodegradable filter material inside webbing, the webbing can be cut and removed, leaving the filter media in place.

PRACTICE 7.38: FILTER BERM

Filter berm installed with silt fence to prevent mulch migration (Source: TDOT, SR840, Williamson County)

See Chapter 7, Page 276

F Berm F Berm F Berm

Purpose and Application. Filter berms act first by reducing runoff flow velocities so that eroded sediments can be settled upstream of the filter. They also act to filter the runoff as it passes through the materials in the berm. Filter berms are installed along the contour to intercept sheet flow. Filter berms may also be used where silt fence would not be feasible due to exposed rock or other conditions which would prevent the fence from being trenched in.

Description. Filter berms are a linear sediment trapping measure composed of wood chips. Woody material that is ground onsite can be used to construct filter berms if the material is not composted before use. To prevent the migration of mulch materials, the berms can be installed in conjunction with other measures such as silt fence (see the picture at the top). Compost material should be avoided, due to its potential to leach nutrients and cause a color contrast. The maximum drainage area to a section of filter berm is ¼ acre per 100 feet of berm. However, as drainage area slopes increase, the treatment capability of filter berms decreases.

Limitations. Mulch is highly effective at solids reduction. However, some filter berm materials can leach nutrients and should not be installed near nutrient sensitive streams. Filter berms should not be installed in areas of concentrated flow. Even in areas of high sheet flow, filter berm material may have a tendency to migrate due to the buoyancy of the mulch material.

Maintenance. Repair filter berms if material migrates or the berm is breached. It may be necessary to install additional downstream measures to prevent mulch migration, such as silt fence. Once the project has been completed, filter berms can be knocked down and seeded.

PRACTICE 7.39: TURBIDITY CURTAIN

Turbidity curtains isolate active work areas in a stream or on the bank of a stream from the rest of the stream, minimizing sediment movement from the work area.

See Chapter 7, Page 279

Purpose and Application. Turbidity curtains may be applied adjacent to the shoreline of a river or lake to contain sediments which may be carried into the water by construction site runoff. They should be considered only where adequate or conventional shoreline sediment control measures are not feasible or possible. They may also be used to surround a work site within the channel of a river (i.e. bridge pier construction, dredging or filling) or within a larger water body in order to prevent worksite sediments from being dispersed.

Description. An in-stream sediment control measure is designed to trap or filter sediment, not to halt the movement of the water itself. This device consists of a filter fabric curtain suspended from floats and held vertically in the water by means of a bottom ballast chain. This measure is placed around a construction site located either adjacent to, or within a water body, to provide an isolated work zone where sediments generated by the project can settle. In this way, it prevents the migration of these sediments into the larger remaining water body.

Limitations. Turbidity curtains should not be considered a primary sediment control and should not be installed across flowing water. This practice should not be applied where anticipated flow velocities will exceed 5 ft./sec.

Maintenance. Repair ripped or separated sections. If water elevation changes significantly causing the floating turbidity curtain to fail, the mooring and anchoring system may need to be adjusted.

PRACTICE 7.40: FLOCCULANTS

See Chapter 7, Page 282

F

A floc log has been installed at the end of the pipe in turbulent flow to mix the flocculant and stormwater. A sediment basin has been installed below this pipe to provide a settling zone for the flocs.

Purpose and Application. Flocculants are chemicals that are used to reduce turbidity in stormwater runoff. Construction sites with clayey soils benefit from the addition of a flocculant. Flocculants are typically applied in a treatment train approach that provides a mixing zone, settling zone and polishing zone.

Description. Flocculation is the process of causing small, suspended materials to stick to each other to form "flocs". These flocs more readily settle out compared to the individual particles. Soil that is exposed during construction or stormwater runoff can be picked up and carried to the nearest water conveyance. As the flow rate slows, the larger sand or pebble particles will settle out of the water, however, the smaller particles take a much longer time to settle out. The flocculants will cause the clay particles to clump together and settle out more quickly. Many types of flocculants are available such as Polyacrylamide (PAM), gypsum and other coagulants. However, sediment at each site must be evaluated for responsiveness to the flocculant. PAM comes in solid (floc logs), liquid, and powder form. Most other flocculants come in powder form. Flocculants are typically introduced in ditches or at pipe outlets to encourage mixing. The treatment train approach is necessary to provide mixing zones in a ditch or other turbulent flow area, a settling area such as a sediment basin, and final polishing through a skimmer or other dewatering device. Anionic PAM is acceptable for use in TN. Cationic PAM is not allowed because of its toxicity to fish and aquatic life.

Limitations. A treatment train must be provided that introduces the flocculant upgradient from the settling zone.

Maintenance. The flocculant will need to be replaced routinely, with the frequency of replacement directly tied to the form of flocculant used. Visual monitoring of the discharge quality of runoff below the treatment train system using flocculant should be performed to ensure that the flocs are settling in the settling area.

PRACTICE 7.41: STREAM BUFFERS

See Chapter 7, Page 286

While the vegetation may not look desirable, the buffer area between the construction project and the river has not been disturbed.

Purpose and Application. Stream buffers have numerous benefits including increased stormwater infiltration and reduced runoff; final polishing of storm water before it's discharged to a stream; habitat creation or protection; and stream corridor protection. Deep rooted vegetation in the buffer area also provides streambank protection and shade to the stream.

Description. A stream buffer is a strip of undisturbed, natural, restored or enhanced vegetation between an active construction site and a stream. Stream buffers are not primary sediment controls and are easily overwhelmed by sediment-laden runoff. Primary sediment controls should treat stormwater runoff prior to discharging into a buffer. Buffers should be identified prior to the start of land disturbing activities and clearly marked throughout the life of the construction activity. Construction equipment should be prevented from entering or disturbing buffers. Construction related materials should not be stored in buffers. Stormwater must be maintained as sheet flow across the length of the buffer to prevent erosion.

TN Requirements. For sites that contain and/or are adjacent to a receiving stream designated as impaired or Exceptional Tennessee waters a 60-foot natural riparian buffer zone adjacent to the receiving stream shall be preserved, to the maximum extent practicable, during construction activities at the site. The natural buffer zone should be established between the top of stream bank and the disturbed construction area. The 60-feet criterion for the width of the buffer zone can be established on an average width basis at a project, as long as the minimum width of the buffer zone is more than 30 feet at any measured location.

A 30-foot natural riparian buffer zone adjacent to all streams at the construction site shall be preserved, to the maximum extent practicable, during construction activities at the site. The riparian buffer zone should be preserved between the top of stream bank and the disturbed construction area. The 30-feet criterion for the width of the buffer zone can be established on an average width basis at a project, as long as the minimum width of the buffer zone is more than 15 feet at any measured location.

Limitations. Stormwater must enter and flow through the buffer as sheet flow. Level spreaders may be required to turn concentrated flow into sheet flow.

Maintenance. Where sediment deposits are identified in buffers, the sediment should be removed by hand, raked out and stabilized, or seeded in place if the deposition will not negatively affect flow through the buffer. Erosion in the buffer must be repaired once identified. Level spreaders should be installed to maintain sheet flow through the buffer.

PRACTICE 7.42: STREAM DIVERSION CHANNEL

See Chapter 7, Page 289

When work is occurring in the natural stream channel, the stream is often diverted around the work area and carried in a stabilized diversion channel.

Purpose and Application. Stream diversion channels are constructed to allow construction in the natural stream channel under dry conditions. Lined stream diversions non-erosively carry the stream flow while isolating it from the active work zone.

Description. Stream diversion channels are temporary structures that non-erosively convey streams around the work zone and reconnect with the natural stream channel below the work zone. Materials that can be used to stabilize the diversion include geotextile fabric, heavy plastic sheeting, and rock. They are used to allow in-stream work to be completed in the dry, separate from flowing water. This reduces the amount of sedimentation which will occur in the stream as a result of the construction activity. Upstream and downstream plugs must be installed in the natural channel to prevent the stream from flowing into the natural channel and into the work zone. Once the work in the natural channel has been completed, the stream is directed back into the stabilized natural channel and the stream diversion channel is removed.

TN Requirements. **All work in a stream must have prior approval from TDEC through the Aquatic Resource Alteration Permit process and all conditions of the ARAP must be followed.**

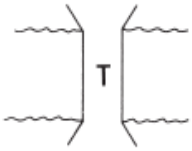
Limitations. Space limitations around the stream must be considered when preparing the stream diversion channel design. Sediment controls cannot be placed in the diversion channel while it is carrying the stream flow. Work around a stream should be planned to minimize the length of time the diversion will be required.

Maintenance. When a storm event occurs that breaches a stream diversion plug, the plug must be re-established as soon as possible. A non-erodible lining must be maintained on all sections of the stream diversion channel and replaced or repaired if torn or loose.

PRACTICE 7.43: TEMPORARY STREAM CROSSING

Clean stone should be used in temporary stream crossings to prevent the migration of fines into the stream.

See Chapter 7, Page 299



Purpose and Application. Temporary stream crossings allow construction equipment to cross a stream without negatively impacting the stream. They should be installed anywhere construction activity crosses a stream channel, even when the channel is dry.

Description. Stream crossings are of three general types: bridges, culverts, and fords. In selecting a stream crossing practice consider: frequency and kind of use, stream channel conditions, overflow areas, potential flood damage, surface runoff control, safety requirements, and installation and maintenance costs. Temporary crossings may overflow during peak storm periods, however, the structure and approaches must remain stable. Clean stone should be used for temporary stream crossings. If fines are included in the stone mix, the fines can migrate downstream and cause sedimentation or water quality problems. The stream should also be isolated from the active work area.

TN Requirements. **All work in a stream must have prior approval from TDEC through the Aquatic Resource Alteration Permit process and all conditions of the ARAP must be followed.**

Limitations. Incorrectly designed or installed stream crossings can be direct sources of water pollution and flooding. They can also be expensive to construct. If washed out or damaged, they can also cause costly construction delays.

Maintenance. Ensure that flow is maintained through the stream crossings. Remove debris and any blockages. Isolate the stream from the active work areas.

PRACTICE 7.44: BIOENGINEERED STREAMBANK STABILIZATION

See Chapter 7, Page 303

Vegetation and structural components are used together to stabilize streambanks. In the picture above, the coir rolls are used to reinforce the toe against erosive velocities.

Purpose and Application. Bioengineerd streambank stabilization incorporates natural and readily available plant material as well as engineered controls. Anywhere streambanks are disturbed, the preferred method for stabilization is to use bioengineered techniques.

Description. Bioengineered streambank stabilization involves using natural materials such as root wads, coconut fiber rolls, and rock veins to direct stream flow away from eroding banks and stabilize the bank. Bioengineering is the preferred method of streambank stabilization.

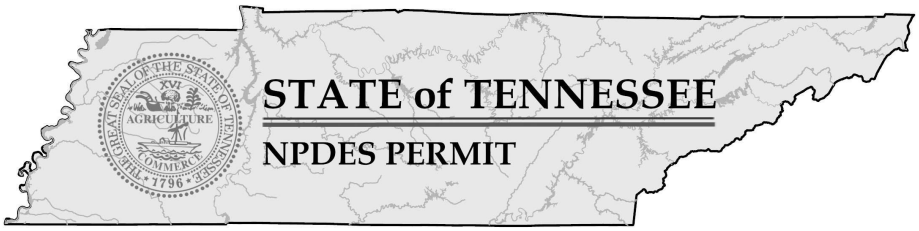
Some streambank stabilization designs involve redirecting stream forces through deflection or creating settling zones. It is highly recommended that individuals with specialized geomorphological design experience be consulted when working in the stream and changing flow patterns. Improperly designed or placed veins or deflectors can cause more damage to the streambank. Such detailed geomorphological analysis and design of streams is not covered in this design manual.

TN Requirements. **All work on streambanks must be conducted in accordance with a valid Aquatic Resource Alteration Permit.**

Limitations. Vegetative and structural materials used to stabilize the stream must not reduce the hydraulic capacity of the stream channel. Sediment control must be practiced to isolate the active construction area from the stream to the extent feasible.

Maintenance. The streambank being stabilized must be monitored while vegetation is getting established to quickly repair damaged vegetation and erosion that may occur. In addition, the channel may need to have routine maintenance on the vegetation after it has established to maintain the hydraulic capacity of the channel.

11. STATE OF TENNESSEE NPDES PERMIT FOR ADJACENT SR-222 ROAD PROJECT



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

Tracking No. TNR122876

Notice of Coverage (NOC) under the General NPDES Permit for
STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES (CGP)

Under authority of the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101 et seq.) and the delegation of authority from the United States Environmental Protection Agency under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251, et seq.) in accordance with effluent limitations, monitoring requirements and other conditions set forth herein. CGP requirements and permit overview are located here. Your coverage under the CGP shall be terminated upon receipt of Notice of Termination (NOT).

Construction Project:	**Memphis Regional Megasite**
Area of Disturbance:	**64.83 acres**
Master Tracking Number:	**TNR122876**
Permittee Name:	**Ford Construction Company**
Project Name:	**SR-222 North Reconstruction and Widening**
is authorized to discharge:	stormwater associated with construction activities
from facility location:	**SR-222 at Blue Oval City, Stanton, TN 38069, Haywood County**
to receiving waters named:	**Big Muddy Tributary**
Effective date:	**03/20/2024**
Expiration date:	**09/30/2026**
Contractors:	**Ford Construction Company**

No Exceptional Tennessee Waters were identified by TDEC.
TDEC identified likely presence of threatened or endangered species downstream from the site. See CGP Section 1.3.
CN-0759 RDA 2366

Print