MITIGATION PLAN (FINAL)

Upper South Hominy Mitigation Site,
South Hominy Creek, French Broad River Basin,
Buncombe County, North Carolina

EEP Project Number: 92632
Contract Number: D06082; Task Order: 08 FB05-1b-d

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Prepared by the North Carolina Wildlife Resources Commission
in Partnership with the

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1 Executive Summary

This North Carolina Ecosystem Enhancement Program (NCEEP) project will preserve, restore, and enhance approximately 5,804 ft of channel on the mainstem of South Hominy Creek (2,750 ft) and on unnamed tributaries (3,056 ft) that feed into South Hominy Creek (SHC) within the project area. Additionally, 1.35 ac of wetland habitat will be preserved or enhanced within the project area. The NCEEP has contracted with North Carolina Wildlife Resources Commission (NCWRC) under task order 08FB05-1b-d to prepare a Mitigation Plan, acquire permits, manage informal contracts, oversee construction, and monitor the post-construction riparian vegetation and channel performance. The Upper South Hominy (USH) mitigation site aims to provide approximately 3,352 stream mitigation units (SMU's) and 0.60 wetland mitigation units (WMU's) to the NCEEP.

The project site is located in Buncombe County, North Carolina, approximately 5.5 miles southwest of Candler, North Carolina. The USH mitigation site is located on properties owned by Bianculli, Lori Bura, James Roberson, and Julia Davis. Combined, a 16.44 acre conservation easement has been deeded on the project area within which all mitigation activities will occur. The conservation easements for the four properties were conveyed to the North Carolina State Properties Office between March and June of 2009.The USH site is located within the French Broad River basin cataloguing unit (CU) 06010105 and within the targeted local watershed hydrological unit (HU) 06010105060020. The project site includes approximately 5,804 ft of perennial stream channel, 1.35 acres of wetlands, no acres of non-jurisdictional hydric soils, and no acres of impacted riparian buffers.

In 2005, the NCEEP developed a Local Watershed Plan (LWP) for the South Hominy Creek watershed. The objective of this plan was to develop a set of management strategies to restore and protect the functional integrity of the watershed, to identify and prioritize stream and wetland project opportunities and to address functional deficits. Specific project sites were identified and prioritized based on a number of factors including the potential for functional improvement, site constraints, potential stream mitigation units (SMU's), location within the watershed, and the number of landowners per site. The USH mitigation project is located within the South Hominy Creek LWP area and coupled with the extensive farm and livestock Best Management Practices, the overall project will help to address watershed stream and wetland function needs as identified in the LWP study, including aquatic habitat, water quality, and hydrology.

Historic land use in the immediate vicinity of the project site has consisted of residential homes and low intensity agricultural operations primarily consisting of livestock grazing and hay production. Stream channels within the project area were historically accessed by livestock, resulting in disturbances to the channel banks and wetland areas. Additional land use practices included removal of large woody riparian vegetation to increase land area for grazing and hay production and mechanized dredging and straightening of stream channels to increase the amount of usable land. These activities have contributed to degraded and unstable stream banks along with compromised water quality due to lack of vegetated buffers, soil erosion, and animal waste.

The goals of the USH mitigation project include:

1. Improve water quality in SHC and unnamed tributaries (UT1-3);
2. Stabilize on-site streams so they transport watershed flows and sediment loads in equilibrium;
3. Promote floodwater attenuation and all secondary functions associated with more frequent and extensive floodwater contact times;
4. Improve in-stream habitat by improving the diversity of bedform features;
5. Protect riparian communities, habitats, and wetlands and enhance floodplain community structure; and
6. Enable improved livestock practices which will result in reduced fecal, nutrient, and sediment loads to project channels.

The objectives of the USH mitigation project include:

1. Restoration of the pattern, profile, and dimension of 1,077 linear feet of the main stem of SHC;
2. Restoration of the pattern, profile, and dimension of the channel for approximately 779 linear feet of unnamed tributaries to SHC on the Bianculli, Roberson/Bura, and Davis properties;
3. Restoration of profile and dimension (Enhancement I) of the channel for approximately 500 linear feet of SHC along the Davis property;
4. Limited channel work combined with livestock exclusion and invasive species control (Enhancement II) on 2,363 linear feet along SHC and unnamed tributaries;
5. Livestock exclusion fencing and other best management practice installations on the Bianculli, Roberson, and Davis properties;
6. Invasive plant species control measures across the entire project wherever necessary;
7. Preservation of 1,085 linear feet of relatively unimpacted forested streams by placing them in a conservation easement for perpetuity; and
8. Preservation or enhancement of approximately 1.35 acres of wetlands across the project site.

Construction approaches were assigned with the intent to minimize disturbance to the stream channels and riparian buffers and focus on those reaches that would benefit most from the appropriate level of site work. As such, areas with stable channel conditions and desirable riparian vegetation were placed into preservation. Other reaches will be treated with restoration and enhancement level I and II site work to improve stream functions and terrestrial habitats that were compromised under the existing site conditions.

Restoration site work on SHC was assigned to the reaches where dimension, pattern, and profile modifications were necessary to correct areas of instability including incision, eroding banks, and over-widened and homogenous channel segments. All SHC restoration site work will be performed using the Priority III approach. The remaining reaches of SHC will be treated with enhancement level I and II site work.

Tributary channels and associated riparian buffers will be treated with the appropriate level of site work to restore functions that have been lost. Three unnamed tributaries are located within the project area. These tributary reaches will be treated with the appropriate amount of site work to preserve, restore, and enhance channel reaches and associated riparian buffers. The upper reaches of the Bianculli tributary north (UT1) and the Davis unnamed tributary (UT3) will be preserved. Restoration level site work on the lower portions of the Bianculli UT1 and the Davis UT3 will be conducted using Priority I strategies. Restoration Priority III strategies will be applied to the lower portion of the Bianculli tributary south (UT2) and the Roberson abandoned channel (UT2) to reconnect that portion of the channel that was dewatered during past roadway construction. The remaining reaches on the tributary channels including the Bianculli UT2 and the middle portion of the Davis UT3 will be treated with enhancement level II strategies.

In-stream installation of rock and wood structures will be utilized throughout the restored and enhanced reaches of SHC. Rock cross vanes and J-hook structures will be utilized for grade control to prevent head-cut formation, to promote stable banks on outside of meander bends, and to increase bed form diversity. Log vanes and root wads will be installed along selected reaches to reduce near bank stress and increase in-stream habitat. Similar materials and structure types will be utilized on the tributary channels, specifically to address grade control, channel slope, and bed form diversity. On-site materials, particularly logs and root wads will be salvaged and incorporated into site construction as much as possible.

Site work will target reconnecting the SHC channel and tributary channels with historic floodplains or by creating a floodplain benches at the desirable elevations to attenuate high flow events. Periodic out of bank flows along with spring seep hydrology should promote and sustain hydric soil characteristics and wetland vegetation types in those areas already supporting jurisdictional wetlands. Areas currently supporting jurisdictional wetlands will be enhanced further by excluding livestock, removing invasive exotic vegetation, and by planting vegetation suitable to the wetland and riparian habitats adjacent to the channel corridors. Additional vegetation planting within the conservation easement area will consist of native wetland and upland shrub and tree species appropriate to the ecoregion.

Overall, the USH mitigation site will include 1,085 ft of stream preservation, 1,856 ft of stream restoration, 500 ft of stream enhancement level I, 2,363 ft of stream enhancement level II, 1.13 acres of wetland enhancement, and 0.22 acres of wetland preservation. A total of 16.44 acres of stream channel, riparian buffer, and jurisdictional wetlands will be protected by a perpetual conservation easement managed by the NCEEP. When completed, it is anticipated that this site should yield 3,352 SMU and 0.60 WMU.

1 Project Site Identification and Location

1.1 Directions to the Site

The Upper South Hominy (USH) mitigation site is located in southwest Buncombe County, North Carolina, approximately 5.5 miles southwest of the town of Candler, North Carolina (Figure A.1). To access the site from Asheville, North Carolina, take I-40 west to the Enka

Candler exit (Exit 44). At the light, turn right onto Smokey Park Highway/US-19S/US-23S and proceed 3.0 miles. Turn left on Pisgah Highway/NC-151S and proceed for 6.0 miles. Turn right on SR1103/S Hominy Road. Proceed 0.2 miles on SR1103/S Hominy Road then turn right on Connie Davis Lane. Connie Davis Lane is a private unpaved driveway that accesses the Bura and Davis properties and the lower end of the project site. A narrow driveway bridge crosses SHC approximately 0.3 miles from the start of Connie Davis Lane. A large fescue pasture to the right of the driveway and bridge, used for parking, is located at a latitude/longitude of 035° 28' 51.10" North and 082° 44' 52.45" West. Access to the upper portion of the reach will be from the second drive to the right past Connie Davis Lane. Turn right off of SR1103/S Hominy Road on to Canter Field Lane, a private drive, 0.25 mile after passing Connie Davis Lane. A fescue pasture located to the left of the private driveway and before the one lane bridge will be used for parking. The pasture is located at a latitude/longitude of 035° 28' 39.35" North and 082° 45' 01.06" West.

2.2 Project Description

Overall, the project site consists of approximately 5,804 ft of stream channels, as measured from the channel centerline on the proposed design drawings. A total of 16.44 acres of aquatic and riparian habitats will be held in a perpetual conservation easement. Channel restoration will be accomplished on 1,077 ft of South Hominy Creek (SHC) along with enhancement Level I (500 ft) and Level II (1,171 ft) approaches (Figure A.2). The project components and attributes are summarized in Tables A.1 and A.4. The Bianculli tributary north (UT1) will be preserved (110 ft) in the upper portion; the lower 138 ft will be restored to provide stable channel banks and connectivity with a bankfull or floodplain feature. The Bianculli tributary south (UT2, 699 ft), including the portion of the abandoned channel on the Roberson property (170 ft), will be mitigated using enhancement Level II and restoration actions. The unnamed tributary on the Davis property (UT3) will be preserved on the upper most 775 ft, enhanced through the middle 538 ft, and restored on the lower 426 ft. The two small spring fed channels on the Davis property (spring seep north 138 ft; spring seep south 72 ft) will be placed into preservation. Project reporting history and contact information are presented in Tables A.2 and A.3.

2.3 USGS Hydrologic Unit Code and NCDWQ River Basin Designation

The USH mitigation site is located in the Hominy Creek watershed of the French Broad River basin, United States Geological Survey (USGS) 8-digit CU 06010105 and 14-digit HU 06010105060020 and within the North Carolina Division of Water Quality (NCDWQ) sub-basin 04-03-02. South Hominy Creek has been assigned the Stream Index Number 6-76-5 by the NCDWQ.

The three spring seep channels and one unnamed tributary channel to SHC in the project area are not identified as blue-line streams on the USGS 1:24,000 (Cruso) topographic quadrangle map. All four are first order tributary channels to SHC. A field evaluation using the NCDWQ stream assessment protocol was conducted. Field observations noted on the NCDWQ Stream Identification Form confirm that the four project tributaries are perennial channels (Appendix B).

3 Watershed Characterization

3.1 Drainage Areas and Watershed Delineations

The USH mitigation site is located in the upper portion of the SHC watershed (Figure A.3). Most of the first and second order headwater tributaries originate below ridgelines and peaks that range in height from 3,000 to over 4,000 ft in elevation. The southern portion of the watershed drains from the highest peak, Mount Pisgah, at a height of 5,721 ft. The drainage area for SHC at the lower end of the project site is 7.1 mi^2 (4,515 ac). The three tributaries named for the purpose of this project as tributary north (Bianculli property, UT1), tributary south (Bianculli property, UT2) have drainage areas <0.1 mi^2. The unnamed tributary on the Davis property (UT3) has a drainage area of 0.1 mi^2 (66.7 ac).

3.2 Surface Water Classification and Water Quality

All surface waters in North Carolina are assigned a primary classification by the NCDWQ. All waters must at least meet the standards for Class C (fishable/swimmable) waters. The other primary classifications provide additional levels of protection for primary water contact, recreation (Class B), and drinking water (Water Supply Classes I through V) (NCDWQ 2010). Class C is the minimal standard for surface waters. Class C waters are for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.

The mainstem of SHC from its source to the confluence with Hominy Creek is classified as Class C waters with a supplemental "Tr" classification. The "Tr" or Trout Waters supplemental classification is intended to protect freshwaters which have conditions which allow for trout propagation and survival of stocked trout on a year-round basis. This classification is not the same as the NCWRC's Designated Public Mountain Trout Waters (DPMTW's) classifications. Although SHC supports wild brown trout *Salmo trutta* and rainbow trout *Oncorhyncus mykiss*, the NCWRC does not have the section of SHC within the project area in the DPMTW's program.

3.3 Physiography, Geology, and Soils

The USH mitigation site is located in the Blue Ridge physiographic province of western North Carolina and within a section of the Southern Crystalline Ridges and Mountains ecoregion that is situated between the High Mountains and Broad Basin ecoregions. The moderately sloped SHC valley is characterized with cross-slopes ranging from 5 to 25%. The longitudinal slope of the valley within the project extent is 1.3%.

The Blue Ridge Mountain physiographic province is a sub set of the of the larger Appalachian Mountain range. The Blue Ridge Mountains began forming during the Silurian Period over 400 million years ago. Most of the rocks that form the Blue Ridge Mountains are ancient granitic charnockites, metamorphosed volcanic formations, and sedimentary limestones

(Wikipedia 2010). The Southern Crystalline Ridges and Mountains ecoregion occur primarily on Precambrian-age igneous and high-grade metamorphic rocks. The crystalline rock types are mostly gneiss and schist, covered by well-drained, acidic, loamy soils. Some small areas of mafic and ultramafic rocks also occur, producing more basic soils. Elevations of this rough, dissected region are generally 1200-4500 ft (EPA 2008).

The four dominant soil types found within the project area were the Iotla loam, Dillard loam, Evard-Cowee complex, and Tate loam according to the United States Department of Agriculture (USDA), National Resource Conservation Service soil survey for Buncombe County (Figure A.4; Table A.5). The Iotla soil series, largest based on area mapped, is found along both sides of SHC for the extent of the project. This series is somewhat poorly drained and considered hydric. A total of 8 series and multiple taxadjusts of the Evard-Cowee and Tate loam series were reported for the project site with most being widely dispersed and occupying <1.6 ac.

3.4 Historical Land Use and Development Trends

Land use in the USH watershed consists largely of forested areas, pasture land, hay fields, and low density residential development (Table A.6). Although land use has resulted in the creation of impermeable surfaces within the watershed, impervious areas are primarily from low density residential development and roads. Low intensity residential and open space land use comprises approximately 3.0% of the watershed, and imperviousness in the watershed is 0.14% (Yang et al 2002; Homer et al 2004). Future residential development pressures can be expected from the current trend of influx of people to Buncombe County and western North Carolina in general; however, dramatic changes in land use in the SHC watershed are not anticipated in the immediate future.

On-site land uses include livestock grazing, hay production, forested areas, and low density farm and residential developments. Grazing of livestock has occurred over many years and access to the stream channels has not been prohibited. Narrow riparian areas and lack of exclusionary fencing have contributed to the degradation of on-site wetlands and channels banks.

3.5 Watershed Planning

The NCEEP identified upper South Hominy Creek watershed as a Targeted Local Watershed (TLW). Watersheds meeting the TLW criteria exhibit the need and opportunity for stream and riparian buffer restoration to benefit water quality, aquatic habitat, and other vital watershed functions (NCEEP 2009).

In 2005, the NCEEP developed a Local Watershed Plan (LWP) for the SHC watershed (NCEEP 2004). The objective of this plan was to develop a set of management strategies to restore and protect the functional integrity of the watershed, identify and prioritize stream and wetland project opportunities, and address functional deficits. Specific project sites were identified and prioritized based on a number of factors including the potential for functional improvements, site constraints, potential stream mitigation units (SMUs), location within the watershed, and the number of landowners per site. The USH mitigation site is located within the

SHC NCEEP LWP area. Coupled with a farm management plan, the overall restoration project will help address stream and wetland function needs as identified in the LWP study.

4 Environmental Screening and Documentation

All environmental screening and environmental resources technical report (ERTR) documentation activities were performed by Confluence Engineering, PC, 16 Broad Street, Asheville, NC 28801 and ClearWater Environmental Consultants, Inc. (CEC), 718 Oakland Street, Hendersonville, NC 28791. All correspondence and documentation associated with the environmental screening, archeological survey, state and tribal historic preservation office, EDR report, flood study report, no-rise certification, farm land conversion impact rating form, and categorical exclusion forms are located in Appendix C.

4.1 Site Evaluation Methodology

CEC conducted a file review of online records maintained by the United States Fish and Wildlife Service (USFWS) and North Carolina Natural Heritage Program (NCNHP). The desktop literature survey involved a review of the USFWS list of protected species in Buncombe County, the Dunsmore Mountain and Cruso USGS topographic quadrangle maps on which NCNHP identifies current and historic occurrences of listed species for that locale. During the field investigations, the study area was assessed for suitable habitat of federally listed species.

4.2 Federally Protected Species

Threatened and endangered plants and animals are protected by the Federal Endangered Species Act of 1973 (16 USC 1531 to 1543) and administered by the USFWS. Any action likely to adversely affect a species classified as federally protected will be subject to review by the USFWS.

4.2.1 Threatened and Endangered Species

There are current and/or historic records of occurrences of federally endangered and threatened species within Buncombe County, the Dunsmore Mountain and Cruso Quadrangle maps. A query of the USFWS database yielded the following list of animal and plant species within Buncombe County at the time this report was generated (Table C.1; USFWS 2009; NCNHP 2010). A query of the NCNHP database yielded the following list of threatened and endangered species within the Dunsmore Mountain and Cruso Quads (Table C.2). A query of the NCNHP database yielded the following list of threatened and endangered species within a 2-mile radius of the project site (Table C.3).

Although it is the opinion of CEC that the project will have “no effect” on listed species, the United States Army Corps of Engineers (USACE) is the ultimate authority when determining the effect a permitted activity will have on a threatened or endangered species. Although it is not anticipated that any activities on site will have an effect on any of the listed species or their critical habitat, all activities and permitting will be required to be coordinated with the USFWS.

4.2.1.1 Species Description

Bog Turtle (*Clemmys muhlenbergii*)

The southern population of the bog turtle, ranging from southern Virginia to northern Georgia, is protected with a threatened designation because its physical appearance is similar to the northern population. The southern bog turtle population is separated from the northern population by approximately 250 miles. However, individual bog turtles in the southern population closely resemble individuals in the northern bog turtle population, causing difficulty in enforcing prohibitions protecting the northern population. Therefore, the USFWS has designated the southern population as "threatened due to similarity of appearance". This designation prohibits collecting individual turtles from this population and bans interstate and international commercial trade. It has no effect on land management activities of private landowners in southern states where the bog turtle lives.

Bog turtles are easily distinguished from other turtles by the large, conspicuous bright orange, yellow, or red blotch found on each side of the head. Adult bog turtle shells are 3 to 4.5 inches in length and range in color from light brown to ebony. Habitat includes sunlit marshy meadows, spring seepages, wet cow pastures, and bogs. The preferred habitat is narrow, shallow, and slow-moving rivulets.

Species classified as "threatened due to similarity of appearance" are not subject to Section 7 consultation and a biological conclusion for this species is not required.

Biological Conclusion: Not applicable.

Carolina Northern Flying Squirrel *(Glaucomys sabrinus coloratus)*

The Carolina northern flying squirrel is a small nocturnal gliding mammal 10 to 12 inches in total length and 3-5 ounces in weight. It possesses a long, broad, flattened tail (80 percent of head and body length), prominent eyes, and dense, silky fur. The broad tail and folds of skin between the wrist and ankle form the aerodynamic surface used for gliding. Adults are gray with a brownish, tan, or reddish wash on the back, and grayish white or buffy white ventrally. Juveniles have uniform dark, slate-gray backs, and off-white undersides.

The northern flying squirrel is nocturnal and found in mixed forests from the Alaskan and Canadian tree line southward to Northern California and Colorado to Central Michigan and Wisconsin and in North Carolina and Tennessee. They are also found in higher elevations (generally over 5,000 feet) of the Southern Appalachian Mountains, the Black Hills, and the Sierra Nevada. Carolina northern flying squirrel and the Virginia northern flying squirrel are subspecies that are on the endangered species list.

Carolina northern flying squirrels are omnivorous. They eat seeds, nuts, and fruits of conifers, oaks, other trees, and shrubs. They also eat lichens, fungi, arthropods, eggs, and birds. They forage in trees and on the forest floor and may bury seeds in ground, or store food in crevices. Flying squirrels use cavities in mature trees, snags, or logs for cover. Most nests are in

cavities in trees or snags. Some nests are constructed on tree branches using twigs and leaves; occasionally a bird's nest is remodeled. Nests are lined with bark, leaves, lichens, or twigs. Mature, dense conifer habitats intermixed with various riparian habitats support flying squirrel populations. Large trees and snags required. These tree squirrels live near rivers and streams, and probably require drinking water, at least in summer.

Biological Conclusion: Suitable habitat for the Carolina northern flying squirrel does not exist within the project area. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the Carolina northern flying squirrel.

Eastern Cougar (*Puma concolor cougar*)

The eastern cougar is known by many common names, including puma, mountain lion, catamount, and panther. Next to the jaguar, it is the largest North American cat. Weights range from 80-225 pounds. Adult cougars weigh an average of 140 pounds and are 7 feet from nose to tip of tail (tail is almost as long as the body). Color is brown to gray above and whitish below. The eastern cougar is described as a large, unspotted, long-tailed cat. Its body and legs are a uniform fulvous or tawny hue. Its belly is pale reddish or reddish white. The inside of this cat's ears are light-colored, with blackish color behind the ears. Sometimes the cougar's face has a uniformly lighter tint than the general hue of the body.

Length varies from 5-9 feet; this measurement includes the 26-32 inch tail. Males are larger than females. Cougars have long, slender bodies and small, broad, round heads. Ears are short, erect, and rounded. The short fur is usually tawny (brownish red-orange to light brown), more tan in the summer months and grayer during the winter. The muzzle, chin and under-parts are a creamy white. Black coloring appears on the tip of the tail, behind the ears, and at the base of the whiskers on the sides of the muzzle. Immature cougars are paler, with obvious dark spots on their flanks.

Lacking definitive evidence of the species' existence, the FWS has presumed the eastern cougar to be extinct. No preference for specific habitat types has been noted; however, the primary need is apparently for a large wilderness area with an adequate food supply. Male cougars of other subspecies have been observed to occupy a range of 25 or more square miles, and females from 5 to 20 square miles.

Biological Conclusion: The presumption of extinction coupled with the unlikelihood of an eastern cougar to be living on the outskirts of a populated area such as Asheville and Enka excludes this species from being within the project study area. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the eastern cougar.

Gray Bat (*Myotis grisescens*)

This bat is a year-round cave dweller that emerges to feed over large bodies of open water. Preferred roosting is in deep, vertical limestone caves usually within three miles of a body of

water. The project study area is located in a stream valley. There are no caves or large bodies of water in the vicinity.

Biological Conclusion: Suitable habitat for the gray bat does not exist within the project area. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the gray bat.

Indiana Bat (*Myotis sodalist*)

Indiana bats usually hibernate in large dense clusters of up to several thousand individuals in sections of the hibernation cave where temperatures average 38 to 43 degrees F and with relative humidities of 66 to 95 percent. They hibernate from October to April, depending on climatic conditions. Density in tightly packed clusters is usually estimated at 300 bats per square foot, although as many as 480 per square foot have been reported.

Female Indiana bats depart hibernation caves before males and arrive at summer maternity roosts in mid-May. A single offspring, born during June, is raised under loose tree bark, primarily in wooded streamside habitat. During September, they depart for hibernation caves. The summer roost of adult males is often near maternity roosts, but where most spend the day is unknown. Others remain near the hibernaculum. A few males are found in caves during summer.

Between early August and mid-September, Indiana bats arrive near their hibernation caves and engage in swarming and mating activity. Swarming at cave entrances continues into mid or late October. During this time, fat reserves are built up for hibernation. It is thought Indiana bats feed primarily on moths.

The range of the Indiana bat is in the eastern United States from Oklahoma, Iowa, and Wisconsin east to Vermont and south to northwestern Florida. Distribution is associated with major cave regions and areas north of cave regions. The present total population is estimated at less than 400,000, with more than 85 percent hibernating at only seven locations: two caves and a mine in Missouri, two caves in Indiana, and two caves in Kentucky.

There are no caves in the vicinity of the project study area. Additionally, riparian habitat which could be use as a maternity roost is greatly disturbed, narrow, or non-existent in many areas.

Biological Conclusion: Suitable habitat for the Indiana bat does not exist within the project area. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the Indiana bat.

Spotfin Chub (*Erimonax monachus*)

The spotfin chub is a small fish with a slightly compressed, elongated body ranging in length from 20 mm to 85 mm. In general, their color is dusky green above the lateral line and silver on the lower sides bordered by gold and green stripes. There are no blotches or speckling on the

body, but the dorsal fin has a dark area posteriorly and a caudal fin spot is distinctive. The species is an insectivore, feeding diurnally presumably by both sight and taste in benthic areas of slow to swift current over various substrates with little siltation. Currently, spotfin chub is known only to occur in Macon and Swain County.

Biological Conclusion: Suitable habitat for spotfin chub could exist within the project study area; however, because of its known range, adjacent land use, and heavy siltation, it is unlikely that South Hominy Creek supports such a species. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the spotfin chub.

Appalachian Elktoe (*Alasmidonta raveneliana)*

The Appalachian elktoe has a thin but not fragile, kidney-shape shell, reaching up to about 3.2 inches in length, 1.4 inches in height, and 1.0 inch wide. Juveniles generally have a yellowish-brown periostracum (outer shell surface) while the periostracum of the adults is usually dark brown to greenish-black in color. Although rays are prominent on some shells, particularly in the posterior portion of the shell, many individuals have only obscure greenish rays. The shell nacre (inside shell surface) is shiny, often white to bluish-white, changing to a salmon, pinkish, or brownish color in the central and beak cavity portions of the shell; some specimens may be marked with irregular brownish blotches. The Appalachian elktoe has been reported from relatively shallow, medium-sized creeks and rivers with cool, well-oxygenated, moderate- to fast-flowing water. It has been observed in gravelly substrates often mixed with cobble and boulders, in cracks in bedrock, and occasionally in relatively silt-free, coarse, sandy substrates. In North Carolina, the species still survives in scattered pockets of suitable habitat in portions of the Little Tennessee River system, Pigeon River system, Mills River, Little River, and the Nolichucky River. South Hominy Creek, the largest tributary in the project study area, is not suitable for Appalachian elktoe due to adjacent land use and heavy siltation.

Biological Conclusion: Suitable habitat for Appalachian elktoe could exist within the project study area; however, because of its known range, adjacent land use, and heavy siltation it is unlikely that South Hominy Creek supports such a species. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the Appalachian elktoe.

Tan Riffleshell (*Epioblasma florentina walkeri*)

The life history and ecological requirements of the tan riffleshell are still largely unknown. Their habitat has been described as shallow and turbid with numerous riffles; substrate consists of loose rock and gravel bars with an abundance of vegetation. Since tan riffleshell is considered a headwater species, it appears to inhabit coarse substrate in riffle areas of small to moderate-sized rivers. The host fish species is unknown for this mussel. South Hominy Creek, the largest tributary in the project study area, is not suitable for tan riffleshell due to adjacent land use and heavy siltation.

Biological Conclusion: Suitable habitat for tan riffleshell could exist within the project study area; however, because of adjacent land use and heavy siltation it is unlikely that South Hominy Creek supports such a species. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the tan riffleshell.

Bunched Arrowhead (*Sagittaria fasciculata*)

Bunched arrowhead is an emergent aquatic plant with spatulate leaves up to 12 inches long and 3/4 inch wide, and white, 3-petalled flowers in an erect spike.

Habitat is within oxbows and seepage areas with very low water flow and no stagnation; soils are sandy loams overlain by l0-24 inches of muck; some shade is beneficial. Bunched arrowhead is currently found only in Henderson County, North Carolina. Wetlands with emergent aquatic vegetation do exist at the site.

Biological Conclusion: Suitable habitat for bunched arrowhead could exist within the project study area; however, because of adjacent land use, loamy soil types, and flow requirements, it is unlikely that wetlands on site support such a species. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the bunched arrowhead.

Mountain Sweet Pitcher Plant (*Sarracenia rubra ssp. jonesii*)

Mountain sweet pitcher plant is a perennial herb which grows from 21 to 73 inches tall. Its numerous and erect leaves grow in clusters and are hollow and trumpet-shaped, forming slender, almost tubular pitchers with a heart-shaped hood. The pitchers are a waxy dull green with criss-crossing maroon-purple veins. The hair inside the pitchers' tube is usually bent downward, and the tubes are often partially filled with liquid and decayed insect parts. Flowers of the mountain sweet pitcher plant are usually maroon with recurving petals. The stalks are erect and bear one flower each.

Habitat is restricted to bogs and streamsides along the Blue Ridge Divide. Mountain sweet pitcher plant populations are generally found in level depressions associated with floodplains. A few populations can be found along the sides of waterfalls and on granite rock faces. Herbs and shrubs usually dominate the bogs where these plants are located, but there may be a few scattered trees. The bog soils are deep, poorly-drained combinations of loam, sand, and silt, with a high organic matter and a medium to highly acidic composition. Wetlands with herbaceous aquatic vegetation do exist at the site.

Biological Conclusion: Suitable habitat for mountain sweet pitcher plant could exist within the project study area; however, because of adjacent land use and livestock impacts, it is unlikely that wetlands on site support such a species. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the mountain sweet pitcher plant.

Spreading Avens (*Geum radiatum*)

Spreading avens is a small herbaceous species which inhabits the Southern Blue Ridge Mountains on high-elevation cliffs, outcrops, and steep slopes which are exposed to full sun. This species also inhabits thin, gravelly soils of grassy balds near summit outcrops.

Distinguishing characteristics include leaves which are mostly basal, with large terminal lobes and stems 8-20 inches tall. During flowering season, this species has an indefinite cyme of large, bright yellow flowers. There are no other similar species of Geum in the Southeast.

Biological Conclusion: Suitable habitat for spreading avens does not exist within the project area. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the spreading avens.

Virginia Spirea (*Spiraea virginiana*)

Virginia spirea has cream-colored flowers on branched and flat-topped axes. This shrubby plant grows from 2 to 10 feet tall and has arching, upright stems. Its alternate leaves are of different sizes and shapes. Distinguishing characteristics include cream-colored flowers and the pedicels; lower leaf surfaces and floral cups are glaucus. Virginia spirea spreads clonally and forms dense clumps which spread in rock crevices and around boulders. Flowering occurs in June and July.

Virginia spirea is unique because it occurs along rocky, flood-scoured riverbanks in gorges or canyons. Although it is an unusual requirement, flood scouring is essential to this plant's survival because it eliminates taller woody competitors and creates riverwash deposits and early successional habitats. These conditions are apparently essential for this plant's colonization of new sites. Virginia spirea is found in thickets and the bedrock surrounding its habitat is primarily sandstone and soils are acidic and moist. Virginia spirea grows best in full sun, but it can tolerate some shade.

Virginia spirea faces a variety of threats. Most extirpated populations were eliminated by reservoir construction, and this is still a threat. Although Virginia spirea needs some flooding to maintain its habitat requirements, severe flooding or inundation caused by dams would eliminate the species. Suitable habitat has disappeared throughout the range, either because of severe flooding or water stabilization which reduces scouring. Clear cutting to stream edges and the removal of riparian soils and vegetation are also a threat. The project site contains no rocky flood-scoured riverbanks.

Biological Conclusion: Suitable habitat for the Virginia spirea does not exist within the project area. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the Virginia spirea.

Rock Gnome Lichen (*Gymnoderma lineare*)

Rock gnome lichen occurs on rocks in areas of high humidity either at high elevations (usually vertical cliff faces) or on boulders and large rock outcrops in deep river gorges at lower elevations. Rock gnome lichen grows in dense colonies of narrow (0.04 inch) straps that are blue-grey on the upper surface and generally shiny-white on the lower surface; near the base they grade to black. Fruiting bodies are borne at the tips of the straps and are black. Flowering occurs from July to September. The project study area is located in a stream valley with no high elevation rock cliffs or boulders and large rock outcrops.

Biological Conclusion: Suitable habitat for the rock gnome lichen does not exist within the project area. The project is not likely to have an adverse effect on this species. It is the opinion of CEC that the project will have "no effect" on the Rock Gnome Lichen.

4.3 Federal Designated Critical Habitat

The USFWS designates critical habitats that are deemed necessary for the survival of a federally listed species. Any activities within designated critical habitat are subject to review and approval by the USFWS.

4.3.1 Habitat Description

Currently, there are no designated critical habitats within the project area or Buncombe County, North Carolina.

Biological conclusion: The project will have "no effect" on designated critical habitat.

4.4 USFWS Concurrence

Ms. Rebekah Newton of CEC spoke with Ms. Marella Buncick of the USFWS, Asheville Field Office on October 15, 2009 about the USH mitigation project. Ms. Buncick indicated that the USFWS does not provide scoping comments for NCEEP projects at this time or phase of the project. Comments from the USFWS could be solicited if a species was observed or suspected on site. CEC did not observe threatened or endangered species or suitable habitat at the site. USFWS review will occur during permit review.

4.5 Cultural Resources

Historic properties, sites of archaeological significance, and cultural resources are protected by the National Historic Preservation Act of 1966 (amended 2006) (16 USC 470 et seq.) and the Advisory Council on Historic Preservation Regulations for Compliance (36 CFR Part 800) administered by the North Carolina State Historic Preservation Office (SHPO). Any action likely to adversely affect cultural, archaeological, or historic recourses is subject to review and approval by the SHPO.

4.5.1 Site Evaluation Methodology

On 1 October 2009, TRC conducted research at the North Carolina Office of State Archaeology (OSA) and the SHPO, Survey and Planning Branch. The research included a review of maps and site files at the OSA for archaeological sites listed in or eligible for inclusion in the National Register of Historic Places (NRHP) and a review of maps and survey records relating to Buncombe County at the SHPO. Historic maps and documents, online and in TRC's library, were also consulted. The literature review is included for review (Figure C.1). In addition, a scoping letter was submitted to the SHPO on 13 November 2009.

4.5.1.1 Field Evaluation

On 5 October 2009, TRC staff visually inspected the project site. TRC staff walked the entire project area and searched for evidence of past cultural activity, examined soil and drainage characteristics, searched soil for artifacts in eroded areas along the tributaries, and searched for potential gravesites or former structure locations. The results of the field reconnaissance are included for review (Figure C.1).

4.5.2 Potential for Historic Architectural Resources

By letter dated 10 December 2009, the SHPO states that it has been "determined that the project as proposed will not have an effect on any historic structures". The SHPO letter is included for review (Figure C.2).

4.5.3 Potential for Archaeological Resources

By letter dated 10 December 2009 (Figure C.2), the SHPO states, "There are no known recorded archaeological sites within the project boundaries. However, the project area has never been systematically surveyed to determine the location or significance of archaeological resources. Based on the topographic and hydrological situation, there is a high probability for the presence of prehistoric or historic archaeological sites within portions of the project area."

"We recommend that a comprehensive survey be conducted by an experienced archaeologist to identify and evaluate the significance of archaeological remains that may be damaged or destroyed by the proposed project. Potential effects on unknown resources must be assessed prior to the initiation of construction activities."

A Phase I archaeological field survey was conducted on 16-18 March 2010. Upon completion of the survey, the TRC Phase I report was submitted to the OSA for review and approval on 15 June 2010. The OSA responded to the Phase I report and concurred with the TRC Phase 1 recommendations. The concurrence letter dated 9 July 2010 from the OSA is included for review (Figure C.2).

4.5.4 SHPO/THPO Correspondence

By letter dated 13 November 2009, Mr. Andrew Bick of Confluence Engineering submitted a scoping letter to SHPO. The scoping letter requested that the SHPO review the project and determine any potential impacts to cultural resources associated with the project. By letter dated 10 December 2009 SHPO responded to the scoping letter (Figure C.2). The SHPO determined that the project will not impact historic structures; however, to make a definitive conclusion about archaeological resources, the SHPO has requested an archaeological survey.

A letter dated 19 January 2010 was sent to the Eastern Band of Cherokee Indians (ECBI), Tribal Historic Preservation Office (THPO) requesting their review of the project because the site is located in a county that is claimed as "territory." The scoping letter is included for review (Figure C.3). The response letter from the EBCI will be forwarded to NCEEP by Confluence Engineering, PC upon its receipt.

4.5.5 Categorical Exclusion

The findings from investigations of the existing and potential cultural and natural resources on-site are further documented on the categorical exclusion form for NCEEP projects (Figure C.4). Additionally, agency correspondence and other supporting categorical exclusion documentation are provided.

4.6 Other Compliance Issues

4.6.1 Hazardous Materials

The presence or likely presence of hazardous substances on the subject property and surrounding area under conditions that indicate a past, present, or potential release into the ground, groundwater, or surface water was evaluated. The evaluation included a review of public record environmental database information and a visual site inspection.

The site inspection included a site walk of all easement areas. The inspection was limited to visual observations of surface conditions at the time of the inspection; no subsurface soil or groundwater sampling or testing was conducted.

4.6.2 Site Evaluation Methodology

A report meeting ASTM E1527-00 Standards for records search requirements was obtained from Environmental Data Resources, Inc. (EDR) in October 2009 summarizing existing federal and state database information regarding known environmental conditions for the subject property and surrounding area.

4.6.3 Potential Contamination Sources

The EDR report indicated no mapped sites were found in their search of available (reasonably ascertainable) government records either on the target property or within the search

radius of the target property. Due to the length of the EDR report, only the executive summary is provided; a complete report will be submitted in electronic format separately (Figure C.5).

The site inspection revealed the presence of scrap metal, construction debris and household goods in and around Davis UT3 and the SHC main stem, but there was no evidence of past or current chemical storage. While there was no evidence to suggest that contamination sources are present at the site, the possibility does exist.

5 Constraints Analysis

The presence of conditions or characteristics that have the potential to hinder mitigation activities on the project site have been evaluated. Existing information regarding project site constraints was acquired and reviewed. In addition, any site conditions that have the potential to restrict the restoration design and implementation were documented during the field investigation.

5.1 Environmental Screening

An environmental screening inspection (ESI) was conducted by Confluence Engineering, PC as part of the site field review on October 5 and 6, 2009. The purpose of the ESI was to visually evaluate the presence or evidence of any recognized environmental concerns within the project study area. Environmental concerns include any objects, activities, or evidence thereof that would have a negative impact on the environment or hinder restoration activities at the site.

The Davis UT3 has a moderate amount of scrap metal along or within the channel throughout its length. These scraps will be removed prior to enhancement or restoration activities. Additionally, significant amounts of road gravel are present within the upper reaches of UT3. There is an ephemeral channel from the upslope road to UT3. This channel is allowing stormwater runoff and road base material easy access to UT3. Stormwater best management practices may be needed to prevent degradation of the newly enhanced or restored channel.

The ESI did not identify environmental concerns that would have the potential to impact the proposed restoration, enhancement or preservation on the project site.

5.2 Utilities and Easements

Visual observation yielded no identifiable easements (utility or otherwise) at the site; however, a deed search was not conducted as a part of this review.

5.3 Hydrological Trespass

The stream reaches within the proposed project boundary are contained entirely within the easement areas procured by the NCEEP. The mainstem of SHC is located within a special flood hazard area as indicated on the Flood Insurance Rate Maps (FIRMs) dated 6 January 2010. The purpose of the flood study is to evaluate the potential flooding effects resulting from the

proposed mitigation activities including bank sloping, floodplain bench excavation, and in-stream rock and wood structures.

According to the Buncombe County FIS, the 100-year discharges for the study reach range from 2,120 to 2,580 cubic feet per second (CFS). Confluence Engineering, PC performed the flood study evaluation using three models, the duplicate effective model, the existing conditions model, and the proposed conditions model. The effective HEC-RAS model and the GIS cross-section shape files were provided by the N.C. Division of Emergency Management. The NCWRC collected the data used to generate the three-dimensional surface model of the project reach. Confluence Engineering, PC concluded that the proposed mitigation activities would not cause a rise in the base flood elevations or an increase in non-encroachment widths. Results from the flood study are summarized in the Flood Study Report (Appendix C; Figure C.6). The floodplain development permit application along with two copies of the flood study report were sent to the Buncombe County Planning Department on 22 January 2010 (Figure C.6). The No-rise was approved by the Buncombe County Planning Department and the concurrence letter and development permit were received on 20 July 2010 (Figure C.6).

5.4 Potential Constraints

Pasture land and several old chicken houses are located north of the Davis UT3. It is anticipated that the portions of the chicken houses that overlap the easement will be demolished as part of the mitigation project construction. Currently, access across the stream is provided by a crude ford. Access will need to be provided to the pasture area and chicken houses after stream enhancement or restoration.

Two bridges, at Canter Field Lane and Connie Davis Road, span SHC within the project study area. These bridges provide access to homes within the project study area parcels and parcels beyond the project study area. The two bridges are in poor condition and any damage to the bridges could present a liability problem. Therefore, these two bridges will be avoided by all construction traffic; all project traffic will be required to utilize the two recently constructed wet crossings to ford SHC.

6 Project Site Existing Conditions Stream Channels

6.1 Existing Conditions Survey

Bianculli Property.—Based on the SHC channel thalweg length, the longitudinal profile on the Bianculli property extended a total of 839 ft (Figure D.1). Channel instability and lateral migration was observed along 600 ft of the Bianculli property reach. Severe instability was observed at the large meander (sta. 1+50 to 3+50 ft). Debris blocking the channel at high flows and a tight radius of curvature at this location are contributing to the instability. Downstream of the meander bend (sta. 3+50 to 6+00 ft) the right channel bank has little to no riparian buffer. Lateral channel migration and active erosion was observed along this section of the channel. In fact, the fence line of the adjoining right bank pasture was in jeopardy of collapsing into the channel at several locations. The portion of the channel from station 0+00 to 6+00 ft will be

modified using a restoration Priority III approach. The remaining portion below the restoration section will be stabilized through enhancement Level II activities.

Two small tributary channels on the Bianculli property also are included in the mitigation project. A small spring fed channel joining SHC from the north (UT1) has been dredged in the recent past resulting in an entrenched condition. The upper portion of the spring seep will be protected through preservation. The lower portion will be restored using a Priority I approach by constructing a new channel that will be connected to the adjacent woodland floodplain. The new spring channel will tail-out into a small vernal pool adjacent to a section of remnant channel of SHC. A second spring seep situated on the south side of the Bianculli property (UT2) also will be protected by conservation easement. The riparian vegetation is dense along much of the channel. Enhancement Level II activities involving removal off exotic invasive plant species and exclusion of livestock are proposed along 654 ft of channel. Restoration activities will occur on the remaining 44 ft of the channel before exiting the Bianculli property. The restoration approach will be to reconnect the Bianculli tributary south to its original channel on the opposite side of the Bianculli driveway. The channel was apparently severed when the driveway was constructed, and the flow was routed to a roadside ditch.

Bura and Roberson Properties.—The longitudinal profile on the Bura (left bank) and Roberson (right bank) properties extended a total of 1,305 ft from the upstream (Bianculli) to downstream (Davis) property lines. The channel in the vicinity of the first large meander bend (sta. 1+00 to 2+50 ft) is over-wide and aggrading downstream of the meander. Channel blockages in the form of a barbed wire fence and a large felled tree across the channel have contributed to the unstable condition at this location. The portion of the channel (150 ft) associated with the unstable meander bend will be modified to the desired dimension, pattern, and profile using a restoration Priority III approach. Three more meander bends (sta. 7+25 to 9+75 ft) were observed to have high near bank stress resulting in actively sloughing banks. These sections will be restored by increasing the radius of curvatures of the meander bends and by constructing a stable channel dimension, pattern, and profile at these locations. The remaining portions of the channel above and below the restoration sections will be reshaped and stabilized through enhancement Level II activities.

One small tributary channel on the Roberson property is included in the mitigation project. The UT2, originating on the Bianculli property, was abandoned when the Bianculli driveway was constructed. The approach will be to restore flow back to the section of abandoned channel (170 ft) on the Roberson property by routing the water under the Bianculli driveway and back to the original channel alignment.

Davis Property.—The SHC longitudinal profile on the Davis property measured a total of 750 ft from the Connie Davis Drive to the downstream property line. Areas of channel bank instability were sparse along the entire section. Some areas along the channel corridor were constricted by debris jams. The channel has few meanders on the Davis property and perhaps has been straightened in the past. Much of the channel bed in this section is homogenous with little bed form diversity present. Although covered by vegetation, dredged spoil material was observed along the top of the banks at various locations. The presence of large woody riparian vegetation has arrested lateral channel migration and the channel banks are largely intact. The

Davis portion of the SHC channel will be enhanced by removing exotic invasive vegetation, grading the high areas at the top of bank to the bankfull elevation, reshaping the channel banks to a stable slope where needed, and installing in-stream structures constructed with rock and wood to diversify the bed form and improve in-stream habitat.

The unnamed tributary (1,730 ft) channel on the Davis property (UT3) will be included in the mitigation project. The upper most portion of the unnamed tributary channel (775 ft) is bordered by a mature upland hardwood forest. Channel banks are stable with little to no areas of erosion observed. The middle portion of the unnamed tributary channel (538 ft) has been impacted from livestock access, channel dredging, and dense stands of exotic invasive vegetation. The lower portion of the unnamed tributary channel (426 ft) was dredged in the past. This has resulted in a deeply entrenched channel condition. The upper portion of the tributary will not need modification and will be placed in preservation. The middle portion of the tributary will be enhanced through berm and exotic vegetation removal. The lower portion of the tributary will be modified using a restoration Priority I approach to regain channel sinuosity and connectivity with the existing floodplain at a higher elevation.

6.2 Channel Morphology and Classification

Site assessment surveys on SHC consisted of 11 cross-sections, a longitudinal profile, and pebble counts using standard stream channel survey techniques (Harrelson et al. 1994; Rosgen 1996; NCSRI 2003). Bankfull was determined using field indicators that included a scour line along the bank, channel benches, and the existing floodplain. The bankfull stage obtained from these measurements was evaluated using the North Carolina mountains and piedmont regional curve information (Harman et al. 1999; Doll et al. 2002).

Dimension.—Seven riffle cross-sections were used to assess channel morphology of the SHC reach (Figure D.2). Mean values were calculated to characterize channel form and condition. Mean bankfull width was 32.0 ft, bankfull depth was 2.2 ft, and cross-sectional area was 69.7 ft^2 (Table D.1 and D.2). The morphological values derived from the reach were similar to the values that were predicted by the regional curve. The width/depth ratio was 15.0 ft, and the entrenchment ratio was 9.8. Broad level channel classification values indicate that SHC is a C stream type.

Pattern.—The channel pattern appears to have been modified in the past along sections of SHC by mechanized straightening and dredging. The past channel alterations are not readily apparent at the upper portion of the reach (Bianculli property), but unstable meander bends with eroding banks were observed. In the middle section (Roberson and Bura properties) and the lower section (Davis property) of SHC past dredging of channel materials was observed. The dredged materials were deposited at the top of the channel bank and have created low berms that are now vegetated. Although the occurrence of the small berms is not wide spread, it has likely influenced the present channel pattern. The mean radius of curvature for SHC was 295.8 ft, with values ranging from 29.7 to 545.1 ft. Channel belt widths ranged from 28.2 to 97.4 ft during the assessment survey, and the mean channel belt width was 56.8 ft. Meander wavelengths ranged from 140.0 to 561.5 ft, with a mean 307.0 ft for the project reach (Table D.3).

Profile.—Based on the channel thalweg length, 2,895 ft of longitudinal profile was surveyed along the entire portion of SHC starting at the upper Bianculli property boundary and continuing downstream to the lower Davis property boundary. The longitudinal profile was segmented into three sections based on property ownership. The break in profile stationing corresponded to driveway bridge crossings and the property boundaries. The location and length of riffles, runs, pools and glides were measured along the channel profile (Figure D.3). Areas of bank erosion and channel instability were noted during the longitudinal profile survey (Figure D.1). The mean riffle length was 53.5 ft, and mean riffle slope was 0.01967 ft/ft. Mean pool length was 42.7 ft and pools were spaced 202.9 ft apart on average (Table D.1).

Bed Material.—Bed material data were collected at seven riffle cross-sections and was used to perform sediment transport calculations. Riffle pebble count data indicate that the mean D50 of the particles observed was coarse gravels, 26.9 mm (Tables D.1 and D.2; Figure D.4). The D50 particle size observed in the reach-wide survey found the particle size to be within the very coarse gravels category, 56.6 mm (Table D.1, Figure D.4). Typically, the riffle D50 value is larger than the reach-wide D50 value because of the finer particle sizes associated with the pool features surveyed in the reach-wide count. Because several large cobble and boulder particles were encountered in the reach-wide survey, the D50 for the reach wide count was higher than expected. Although cobbles and boulders are present along the project reach, overall the bed material is characterized as having coarse to very coarse gravels. Outcroppings of bedrock were not observed.

6.2.1 Unnamed Tributary Morphology

Dimension.—Three riffle cross-sections were surveyed to assess channel morphology on the Davis UT3 (Figure D.2). Values derived from the upper most cross-section were used as a reference condition as this transect is located in an stable undisturbed area. Bankfull width at the reference cross-section was 10.0 ft, bankfull mean depth was 0.7 ft, and cross-sectional area was 7.4 ft^2. The width/depth ratio was 13.8 ft, and the entrenchment ratio was 1.5. Broad level channel classification values indicate that the Davis UT3 is a B stream type. A second cross-section located just above the wet ford in the section proposed for enhancement was determined to have a bankfull width of 3.9 ft. Mean depth was 1.2 ft, and the width/depth ratio was 3.3 ft. Channel entrenchment was moderate at cross-section 2 with a value of 1.5. Cross-section 3 was located in the portion of the reach proposed for restoration. Bankfull width at this cross-section was 4.4 ft, mean bankfull depth was 1.5 ft, and the width/depth ratio was 3.0 ft. The entrenchment ratio was 3.1. Channel morphology at cross-sections 2 and 3 have been modified by dredging and other perturbations. Although the values do not indicate a highly entrenched condition, the channel is in a deep gully, particularly at cross-section 3. Cross-section transects were not surveyed at the Bianculli tributary channels (UT1 and UT2).

Pattern.—Pattern geometry of the three tributary channels (UT1-3) was very homogenous. Sinuosity ranged from 1.0 to 1.05 for each of the four channels. As such, pattern geometry was not reported for UT1 or UT2. Channel pattern will be improved on the Bianculli tributary north, (UT1) and the Davis tributary (UT3) during project construction. Modifications will increase the sinuosity of both channels. The occurrence of a large berm has likely influenced channel pattern on UT3. The mean radius of curvature for UT3 was 86.4 ft, with values ranging from 45.5 to

146.8 ft. Channel belt widths ranged from 6.8 to 39.5 ft, and the mean channel belt width was 24.7 ft. Meander wavelengths ranged from 8.5 to 180.3 ft, with a mean 52.8 ft (Table D.3).

Profile.—Based on channel thalweg length, 1,162 ft of longitudinal profile was surveyed along UT3. Roughly 600 ft in the upper most conservation easement area was not surveyed. The longitudinal profile was divided into two sections for plotting purposes based significant break in slope along the channel (Figure D.3). The first section extended from the forested reach to be placed in preservation down to the wet ford. The slope in this section was 0.1000 ft/ft. Channel slope of UT3 from below the wet ford and deep gully to the mouth was 0.0300 ft/ft. The location and length of riffles, runs, pools and glides were not measured due to insufficient flow at the time of the survey. Areas of bank erosion and channel instability were noted during the longitudinal profile survey (Figure D.1). The Bianculli tributary north (UT1) was surveyed starting just below the old chicken house down to the mouth, a total distance of 152.5 ft (Figure D.3). A break in channel slope also was noted on UT1. The slope in the first 70 ft was 0.0180 ft/ft; whereas, the slope for the remaining portion of UT1 was 0.0550 ft/ft.

6.3 Valley Classification

The SHC valley is classified as a type VIII and is characterized by wide valley walls, gentle slopes, and a well-developed floodplain adjacent to remnant river terraces. These features narrow the valley width on the left and right banks of the project site. The valley floor has a floodplain width of ≈200 to 590 ft within the project area and maintains this width some distance below the project reach. The project reach has a valley slope of 0.00980 ft/ft. The channel is only slightly meandering, having a sinuosity of 1.11, an indication of past channel straightening.

6.4 Channel Stability Assessment

Channel stability was assessed during the longitudinal survey and subsequent site visits. Areas of instability along SHC, and tributary channels are noted on Figure D.1.

6.5 Vegetation and Habitat Descriptions

Riparian Buffer.—The riparian buffer on both banks of SHC is largely intact. The upper portion (Bianculli property) of the riparian area on the left bank is well vegetated, but the right bank riparian buffer has been removed to allow for hay production and other agricultural uses (e.g., livestock grazing and barn construction). Mature trees are present on both banks of the channel in the middle section (Roberson and Bura). However, mature woody vegetation is sparse along sections of the left bank. Small sections of an old berm are present but only on the right bank (Roberson property). The right bank buffer is narrow (<30 ft) along much of the middle portion of the reach. Both the left and right banks in the lower portion of the project reach (Davis property) are vegetated with mature woody vegetation, but the riparian buffer width is narrow (<30 ft). The narrow buffer is adjoined by large fescue pastures on either side of the channel. Remnants of dredging also are apparent with berms on both banks in the lower portion of the reach.

Various types of fencing wire, scrap metal, and other foreign materials were observed within the channel and riparian buffer along both banks for the entire project reach. All metal and other foreign objects will be removed from the channel banks and riparian areas during construction and hauled off site for disposal at the county landfill. Immediately outside the riparian buffer are frequently maintained fescue pastures. The edges of the fescue pastures will be incorporated into the conservation easements and replanted with native vegetation.

The riparian buffers on all the three unnamed tributaries are largely intact but the widths of the buffers and density of woody vegetation should be increased. The riparian buffers along both of the Bianculli tributraries are characterized by moderate aged hardwood trees, shrubs, and under brush. The unnamed tributary on the Davis property (UT3) is adjacent to heavily wooded areas in the upper and middle portions. The lower portion of the channel is bordered by fescue pastures on both banks.

Within the riparian areas, native shrubs and trees were observed during the assessment survey. Species include: red maple *Acer rubra*, tag alder *Alnus serrulata*, eastern sweetshrub *Calycanthus floridus*, black walnut *Juglans nigra,* Poplar *Liriodendron tulipifera,* hornbeam *Ostrya virginiana*, sycamore *Platanus occidentalis*, black cherry *Prunus serotina*, black locusts *Robinia pseudo-acacia*, and river birch *Betula nigra*. Invasive exotic species present include Oriental bittersweet *Celastrus orbiculatus*, Japanese honeysuckle *Lonicera japonica*, Japanese privet *Ligustrum japonicum*, and multiflora rose *Rosa multiflora* which individually or in combination dominate portions of the riparian area and impede colonization by beneficial native vegetation. Riparian vegetation also consists of many species of herbaceous plants.

6.6 Existing Conditions Photographic Log

A photographic log of existing conditions at the USH mitigation site are presented in Appendix D; Figure D.5.

7 Reference Streams

A suitable reference reach was not located on SHC. Therefore, morphological data from a stable reference reach channel with the same stream type and valley type was desired (Rosgen 1998). Reference reach surveys from Basin Creek (Wilkes County; D. Clinton et al. 1998), Bent Creek (Buncombe County; Rosgen Level II Course 2008) and Meadow Fork Creek (Watauga County; A. Jessup et al. 2003) were used because they are the same stream type (C4), and situated in the same type valley (VIII) as the SHC project reach. Accepted methods were utilized at these sites to characterize the cross-sectional dimensions, pattern, profile, and substrate of these reference reaches (Harrelson et al. 1994; Rosgen 1996; NCSRI 2003). Dimensionless ratios derived from the reference reach data were used along with the mountain regional curve data to calculate design values for SHC (Table D.1).

Reference reach data selected for the upper portion of Davis UT3 was from the Morgan Creek restoration site in Haywood County, North Carolina. Data collection on this Ba stream type was performed by Wolf Creek Engineering, PPLC. The North Branch reference data was selected because it is similar to the Davis UT3 upper restoration section in channel slope and

step-pool morphology (Table D.1a). The remaining portion of Davis UT3 has a lower slope and higher sinuosity; therefore, a C reference reaches was selected. Reference surveys from Basin Creek (Wilkes County; Harmon et al. 1998) was used to develop the range of design values (Table D.1a).

8 Project Site Existing Conditions Wetlands

Surface waters and wetlands are defined as waters of the United States under Section 33 of the Code of Federal Register Part 328.3. As defined, wetlands are those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated conditions. Any action that proposes to fill these areas falls under the jurisdiction of the United States Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (33 U.S.C. 1344).

Section 401 of the Clean Water Act delegates authority to the states to issue a 401 Water Quality Certification for all projects that require a federal permit (such as a Section 404 Permit). The permit allows the state to verify that a given project will not degrade waters of the state or otherwise violate water quality standards. NCDWQ administers surface water and wetland standards for the state under Section 401 of the North Carolina Administrative Code (15A NCAC 02B .0100 and .0200).

8.1 Site Evaluation Methodology

Waters of the United States were evaluated both in the office and in the field by the team of Confluence Engineering, PC and ClearWater Environmental Consultants, Inc (CEC). The office review included examining National Wetland Inventory (NWI) maps and databases for any mapped wetland areas. USGS topographic maps and National Resources Conservation Service (NRCS) soil surveys were used to identify any potential jurisdictional waters. Criteria to delineate and/or determine whether wetlands are jurisdictional include evidence of hydric soils, hydrophytic vegetation, and evidence of certain hydrologic characteristics during the growing season.

8.2 Jurisdictional Wetlands

Using the aforementioned wetland criteria, CEC identified nine wetlands totaling approximately 1.35 acres in the project area during an October 2009 field investigation (Figure E.6). The dominant soil types for all nine wetlands are mapped as Iotla loam (IoA) and Dillard loam (DrB); both soil types are classified as hydric soils by the NRCS. USACE Wetland Data Forms and representative photos are provided for review (Figure D.6).

Wetland C (also referred to as Davis spring seep south) is approximately 0.01 acre and is adjacent to Davis UT3. This wetland is linear and appears to have been ditched in the past. There is a hand built rock spring box at the head of this feature. Vegetation in this wetland includes sedges (*Carex spp*.), soft rush (*Juncus effuses*), tearthumb (*Polygonum sagittatum*), and mountain mint (*Pycnanthemum spp*.).

Wetland D is the largest wetland on site totaling approximately 0.69 acre. This wetland is adjacent to SHC and has been greatly impacted by cattle. In a few locations there is standing water in this wetland. There are a few large trees in this wetland; however, the majority of the wetland vegetation is herbaceous. Despite the impact by cattle, Wetland D has the highest diversity of wetland plant species found within the study area. Additionally, multiple species of wildlife were observed using this area; they included frogs, butterflies, birds, and a beaver. Vegetation in this wetland includes red maple *Acer rubrum*, sedges, joe-pye weed *Eupatorium maculatum*, jewelweed *Impatiens capensis*, cardinal flower *Lobelia cardinalis*, marsh forget-me-not *Myosotis laxa*, sycamore *Platanus occidentalis*, smartweed *Polygonum pensylvanicum*, tearthumb, buttercup *Ranunculus abortivus*, black willow *Salix nigra*, elderberry *Sambucus canadensis*, golden rod *Solidago spp*., New England aster *Symphyotrichum novae-angliae*, and New York ironweed *Vernonia noveboracensis*.

Wetland E is approximately 0.02 acre and is adjacent to SHC and UT2. This wetland has been greatly impacted by cattle. A large tree stump and root ball are present at the head of this feature. Vegetation in this wetland includes jewelweed, soft rush, privet (*Ligustrum sinense*), smartweed, buttercup, and golden rod.

Wetland G is approximately 0.05 acre and is contiguous with Bianculli UT2 and adjacent to Canter Field Lane. Wetland G vegetation is mostly herbaceous with a few trees around the edge and includes red maple, sedges, jewelweed, soft rush, smartweed, woolgrass (*Scirpus cyperinus*), golden rod, and New England aster.

Wetland H is approximately 0.05 acre and is located adjacent to Bianculli UT2. Vegetation in this wetland includes tag alder (*Alnus serrulata*), sedges, jewelweed, spicebush (*Lindera benzoin*), cinnamon fern (*Osmunda cinnamomea*), and netted chain fern (*Woodwardia areolata*).

Wetland I is approximately 0.06 acre and is located adjacent to Bianculli UT2 and within the mowed pasture. Vegetation in this wetland includes sedges, joe-pye weed, jewelweed, smartweed, buttercup, and New York ironweed.

Wetlands J and K combined are approximately 0.04 acre and are located within the mowed pasture and adjacent to the property line. These wetlands are associated with what appears to be an abandon pond. This area was excavated; no outfall structure was observed. Wetland J appears to be a remnant of a ditch that was dug from UT2 to the pond. It is speculated that during heavy rain events, water from UT2 would rise and a portion of it would flow into the pond. Water in excess of the pond capacity appears to overflow into the adjacent field. This was evident by an adjacent wetland. This wetland, however, was not within the study area and was therefore not delineated or included on the map. Wetland K is ponded with the majority of the vegetation comprised of sedges. There are large trees on the wetland edge.

Wetland L is approximately 0.44 acre and is the second largest wetland within the project area. Wetland L is located adjacent to SHC and Bianculli UT1. It is a forested wetland with trees and shrubs throughout. One burrowing crayfish was observed at this wetland along with numerous crayfish chimneys. Evidence of beaver activity was also observed. Vegetation in this wetland includes red maple, tag alder, ironwood (*Carpinus caroliniana*), jewelweed, privet,

spicebush, tulip poplar (*Liriodendron tulipifera*), sycamore, smartweed, greenbriar (*Smilax rotundifolia*), golden rod, and New York fern (*Thelypteris noveboracensis*).

9 Mitigation Plan

9.1 Mitigation Plan Goals and Objectives

The goals of the USH mitigation project include:

1. Improve water quality in SHC and unnamed tributaries (UT1-3);
2. Stabilize on-site streams so they transport watershed flows and sediment loads in equilibrium;
3. Promote floodwater attenuation and all secondary functions associated with more frequent and extensive floodwater contact times;
4. Improve in-stream habitat by improving the diversity of bedform features;
5. Protect riparian communities, habitats, and wetlands and enhance floodplain community structure; and
6. Enable improved livestock practices which will result in reduced fecal, nutrient, and sediment loads to project channels.

The objectives of the USH mitigation project include:

1. Restoration of the pattern, profile, and dimension of 1,077 linear feet of the main stem of SHC;
2. Restoration of the pattern, profile, and dimension of the channel for approximately 779 linear feet of unnamed tributaries to SHC on the Bianculli, Roberson/Bura, and Davis properties;
3. Restoration of profile and dimension (Enhancement I) of the channel for approximately 500 linear feet of SHC along the Davis property;
4. Limited channel work combined with livestock exclusion and invasive species control (Enhancement II) on 2,363 linear feet along SHC and unnamed tributaries;
5. Livestock exclusion fencing and other best management practice installations on the Bianculli, Roberson, and Davis properties;
6. Invasive plant species control measures across the entire project wherever necessary;
7. Preservation of 1,085 linear feet of relatively unimpacted forested streams by placing them in a conservation easement for perpetuity; and
8. Preservation or enhancement of approximately 1.35 acres of wetlands across the project site.

9.2 Proposed Channel Design

9.2.1 Bianculli Property Approach

South Hominy Creek. Restoration – 600 ft

- Remove foreign materials from the channel banks and riparian areas.
- Construct new channel dimension, pattern, and profile to stabilize right and left banks; construct cross-vane structure for grade control; remove in-stream channel restriction

(blockage) in meander bend to establish a stable radius of curvature, dimension, pattern, and profile.
- Construct J-hook structures in meanders, where appropriate, to provide long-term bank stability, to increase bed form diversity, and to modify the channels width and depth.
- Install root-wads to provide added bank protection and enhance aquatic habitat.
- Plant native trees, shrubs, and ground cover on all disturbed banks and along the channel to provide long term bank stability, shade, and cover and food for wildlife.

South Hominy Creek. Enhancement Level II – 169 ft
- Remove foreign material from the channel banks and riparian areas.
- Slope and shape both channel banks and establish a bankfull bench and inner berm features, where appropriate, to make the banks more resistant to erosion.
- Plant native trees, shrubs, and ground cover on all disturbed banks and along the channel to provide long term bank stability, shade, cover, and food for wildlife.

Tributary North (UT1). Preservation & Restoration – 138 ft
- Preserve the upper channel portion (110 ft) of the spring seep tributary
- Restore the lower 245 ft of the spring seep tributary to the confluence with SHC by modifying channel dimension, pattern, and profile; reduce channel entrenchment by constructing bankfull and floodplain relief.

Tributary South (UT2). Enhancement Level II & Restoration – 699 ft
- Enhance the first 654 ft of the spring seep by excluding livestock and removing exotic invasive vegetation from within the conservation easement area.
- Restore the remaining 45 ft of channel by removing it from a roadside ditch and reconnecting the seep with its historical channel.

9.2.2 Roberson and Bura Properties Approach

South Hominy Creek. Restoration – 477 ft
- Remove foreign materials from the channel banks and riparian zone.
- Construct new channel dimension, pattern, and profile to stabilize right and left banks; construct rock structures for grade control; remove in-stream channel restriction (blockage) in meander bends to establish a stable radius of curvature, dimension, pattern, and profile.
- Construct J-hook structures, in meanders where appropriate, to provide long-term bank stability, to increase bed form diversity, and to modify the channels width and depth.
- Install root-wads to provide added bank protection and enhance aquatic habitat.
- Plant native trees, shrubs, and ground cover on all disturbed banks and along the channel to provide long term bank stability, shade, and cover and food for wildlife.

South Hominy Creek. Enhancement Level II – 775 ft
- Remove invasive exotic vegetation and foreign materials from the channel banks and riparian zone.

- Slope and shape both channel banks and establish a bankfull bench and inner berm features, where appropriate, to make the banks more resistant to erosion.
- Plant native trees, shrubs, and ground cover on all disturbed banks and along the channel to provide long term bank stability, shade, cover, and food for wildlife.

9.2.3 Roberson Property Approach

Abandoned Channel (originating on the Bianculli property, UT2). Restoration - 170 ft
- Restore flow to the abandoned channel by re-connecting channel with the tributary from adjoining property (Bianculli) that is currently diverted into a driveway ditch line.

9.2.4 Davis Property Approach

South Hominy Creek. Enhancement Level I – 500 ft
- Remove foreign material from the channel banks and riparian zone.
- Slope and shape both channel banks and establish inner berm and bankfull bench features, where appropriate, to make the banks more resistant to erosion.
- Install root wads and in-stream structures, where appropriate, to provide long-term bank stability, to increase bed form diversity, and to narrow and deepen the stream channel.
- Plant native trees, shrubs, and ground cover on all disturbed banks and along the channel to provide long term bank stability, shade, cover, and food for wildlife.

South Hominy Creek. Enhancement Level II – 227 ft
- Remove foreign material from the channel banks and riparian areas.
- Slope and shape both channel banks and establish bankfull bench and inner berm features, where appropriate, to make the banks more resistant to erosion.
- Plant native trees, shrubs, and ground cover on all disturbed banks and along the channel to provide long term bank stability, shade, cover, and food for wildlife.

Unnamed Tributary (UT3). Preservation – 775 ft
- Preserve the upper channel portion (775 ft) of the unnamed tributary.

Unnamed Tributary (UT3). Enhancement II – 538 ft
- Remove foreign materials from the channel banks and riparian zone.
- Remove exotic invasive vegetation and exclude livestock from within the conservation easement area.
- Slope and shape both channel banks and establish bankfull bench and inner berm features, where appropriate, to make the banks more resistant to erosion.

Unnamed Tributary (UT3). Restoration – 426 ft
- Restore desired dimension, pattern, and profile to the lower portion of the unnamed tributary by increasing sinuosity and raising the bed elevation up to the existing floodplain elevation.
- Install grade control structures, where appropriate, to provide long-term bank stability, and to increase bed form diversity.

- Slope and shape both channel banks and establish inner berm and bankfull bench features, where appropriate, to make the banks more resistant to erosion.
- Plant native trees, shrubs, and ground cover on all disturbed banks and along the channel to provide long term bank stability, shade, and cover and food for wildlife.

Spring Seep to Unnamed Tributary 3 (north). Preservation – 138 ft

- Preserve the channel (138 ft) of the two upper spring seeps that drain into the Davis unnamed tributary.

Spring Seep to Unnamed Tributary 3 (south). Preservation – 72 ft

- Preserve the channel (72 ft) of the lower spring seep that drains into the Davis unnamed tributary. This is also referred to as wetland "C" in the text.

9.3 Sediment Transport Analysis

The restoration design for SHC was evaluated for its competency to transport the sediment supplied by the watershed (Rosgen 2006). Critical dimensionless shear stress was calculated and compared with the particle sizes expected to be mobilized at the bankfull flow (Table D.1). The predicted particle sizes expected to be mobilized were compared with the sizes of bed material found in the existing channel. The D50 for riffle bed material across the project reach ranged from 17.3 to 39.2 mm, with a mean of 26.9 mm. The D84 at the riffle cross-sections ranged from 79.4 to 124.4 mm with a mean of 97.3 mm. The largest particle measured from the bar sample was 98.0 mm. The proposed design is to mobilize particles 71.0 to 160.0 mm with a critical shear stress of 0.5 to 1.2 lb/ft^2 (Figure D.7). Estimated bankfull discharge (cfs) and velocity (fps) calculations are provided in Table D.1 and Figure D.8.

9.4 Farm Management Plan

This mitigation project will include livestock best management practices (BMPs) such as livestock exclusionary fencing and developed watering facilities on the Bianculli, Roberson, and Davis properties. The NCEEP is funding all livestock BMPs in full through a task order contract with the North Carolina Division of Soil and Water Conservation. The Buncombe County Soil and Water Conservation District (BCSWCD) will help manage the installation of the BMPs through that contract. Additional details on the locations and quantities of the planned livestock BMPs are included for reference (Appendix E).

10 Site Construction

The construction sequence for the USH mitigation site is provided below. Design drawings and construction specifications are provided in Appendix F.

NCWRC Responsibilities

1. Provide Mitigation Plans to NCEEP and direct implementation of plan by supervising construction.
2. Obtain USACE 404, NCDWQ 401, NCDLQ erosion and sedimentation control, and trout buffer waiver approvals for this project.
3. Provide erosion control materials and confirm that they are stockpiled at the work site prior to the startup date.
4. Maintain a daily log of hours worked, the linear footage of stream completed and notes of other activities taking place each day. Contractor or his representative should sign this log each day.
5. Locate any underground utilities and mark locations prior to ground disturbing activities.
6. Be on site while contractor is working to guide work. Construction is anticipated to be completed within 90 days of the start date.
7. Provide thorough photo documentation of access roads, bridges, buildings adjacent to project area (i.e., everything outside the conservation easement) prior to any construction activity. Private bridge crossings on Canter Field Lane and Connie Davis Road will be avoided completely by all construction traffic during the extent of the project.
8. Following completion of construction, the conservation easement boundary will be marked. Where livestock fencing coincides with the conservation easement boundary signage (provided by NCEEP) will be attached to fence posts every 50-100 ft. Where there is no fencing installed along the boundary, metal T-posts will be erected at every conservation easement cap (turn) and marked with signage. Additional metal T-posts will be erected in between the easement caps when the distance between caps is greater than 100 ft or when terrain or line of sight warrant additional marking to clearly signify the easement boundary.

Contractors Construction Sequence

1. Contractor should use the first day to move equipment on the project site along routes designated by the NCWRC.
2. Access to the site will be from Connie Davis Road and Canter Field Lane. All damage or impacts to access roads will be repaired immediately if it poses a risk to water quality or at the request of the project manager. The private bridge on Canter Field Lane and Connie Davis Drive are to be avoided completely by all construction traffic; all project traffic will be required to utilize the stream ford crossing. The bridges are to remain open for private residents use only.
3. NCWRC will walk through the entire project site with the contractor.
4. Removal of any beaver dams may be requested during construction at the discretion of the NCWRC.
5. Delineate, clear, and haul stone to prepare construction access roads on site. The construction entrances and access lanes shall be maintained to the specifications of the detail. All public roads shall be kept free of mud and debris. Existing drives and entrances shall be returned to the pre-existing condition prior to equipment demobilization.

6. Establish high ground spoil areas at the upper and lower reaches of the project site. Upper spoil area to be located on the right bank of the Bianculli property in the pasture. Lower spoil area to be located on the left bank of the Davis property in the pasture.
7. Install erosion control practices around material staging and spoil areas.
8. Haul rock to the site for building stream structures. Rock will staged adjacent to structure installation locations.
9. Remove non-native vegetation within the conservation easement area. Salvage and heel-in native trees and shrubs that can be re-planted. Salvage and stockpile larger trees for log vane and root-wad structures.
10. All woody waste material will be burned on-site in accordance with local regulations.
11. Cover disturbed ground with seed mixes, fertilizer, straw, coir or jute matting by the end of each work day.
12. The construction sequence will begin at the upper portion of the project reach on the Bianculli property. The Bianculli tributary north (UT1) will be worked first. A new channel will be constructed in the woodland area. The existing entrenched channel will be backfilled with material formerly dredged from the existing channel and with spoil material from construction of the new UT1 channel.
13. Beginning at the upper most segment of SHC on the Bianculli property, Excavate floodplain benches and shape channel banks to design elevations. Slope from the back of the bankfull benches to existing ground elevation not to exceed 1:1. Earthwork shall be staged such that no more channel banks will be disturbed than can be stabilized by the end of the work day.
14. Construct J-hook rock and log vanes and root-wad structures at locations shown on the design drawings when these stations are reached in the clearing, excavation, and bank shaping process.
15. Remove all non-native vegetation within the conservation easement area along the Bianculli tributary south (UT2). Removal of non-native vegetation on UT2 shall be accomplished by mechanized removal when reachable from dry ground; however, a portion of the unwanted vegetation will be removed by hand to prevent damage to channel and wetland areas associated with the tributary. Lower most portion of UT2 will be placed back into its original channel alignment by channeling the flow under the Canter Field Lane driveway. A properly sized culvert will be placed under the driveway and flow established to the previously abandoned channel on the Roberson property.
16. Begin excavation of floodplain benches and shape channel banks on the Roberson and Bura segment of the SHC. Construct J-hook rock and log vanes and root-wad structures at locations shown on the design drawings when these stations are reached in the clearing, excavation, and bank shaping process. Connect UT2 and Roberson wetland "D" to mainstem of SHC when the areas are reached in the process of working downstream on SHC. Removal of non-native vegetation on UT2 shall be accomplished by mechanized removal from dry ground; however, the majority of the unwanted vegetation will be removed by hand to prevent damage to channel and wetland areas associated with the tributary. Complete any final floodplain and bank shaping before moving equipment to next targeted channel segment, replant salvaged trees and shrubs, cover any remaining disturbed areas with temporary and permanent seed mix, straw mulch, and matting.

17. Begin excavation of floodplain benches and shaping channel banks on the Davis segment of SHC starting just downstream of the Davis bridge. Construct J-hook rock and log vanes and root-wad structures at locations shown on the design drawings when these stations are reached in the clearing, excavation, and bank shaping process. Transition construction activities from SHC to the upper portion of the Davis unnamed tributary (UT3) before lower portion of SHC clearing and grading is completed. Remove all non-native vegetation from the within the conservation easement along the upper segment of UT3 and shape channel banks where indicated. Remove corner blocks of old chicken house that is encroaching in the conservation easement and pile material in center of the old chicken house. Use sand bags to construct temporary coffer dam to collect flow and pipe water to Davis spring seep (south). Construct in the dry the step-pool rock feature in gully below UT3 wet ford. Construct Priority 1 channel beginning just downstream from confluence with Davis spring seep (south) and ending at mouth of UT3. Resume floodplain benching and bank shaping on lower portion of the Davis SHC reach. Construct J-hook rock and log vanes and root-wad structures at locations shown on the design drawings when these stations are reached in the clearing, excavation, and bank shaping process.
18. Complete any final floodplain and bank shaping before removing equipment, replant salvaged trees and shrubs, cover any remaining disturbed areas with temporary and permanent seed mix, straw mulch, and matting.
19. Finish grade spoil and construction staging areas and cover with seed and straw mulch.
20. Inspect and add any needed erosion control measures.
21. Remove all unused construction materials, including any trash or waste, from project site.
22. Erosion control structures will be checked weekly and after every significant rainfall event while the project proceeds to insure proper function. Regular inspections will continue and modifications made after project completion or until permanent vegetation is established. Any needed maintenance or repair will be made by the NCWRC immediately after the inspection and no later than 5 days after determination is made.
23. The NCWRC and the contractor will make a final inspection to insure that the project is complete before equipment is removed from the site. Construction is anticipated to be completed within 90 days of the start date.
24. After the final inspection and NCWRC approval of construction, equipment will be removed along approved routes on the final day.

10.1 In-Stream Structures and Other Construction Materials

In-stream structures are proposed for the main stem of SHC and all four unnamed tributaries on the USH mitigation site. Structure elements will incorporate the use wood and rock materials into the project design. Structures will largely consist of root-wads, log vanes, rock vanes, and boulder steps. These structural elements will be installed to provide grade control, bank protection, and habitat enhancement at targeted locations. Root-wads will be installed in the outside of meander bend to provide bank protection to provide aquatic habitat. Log vanes structures will be used to provide bank protection and to improve bed form diversity in SHC. Rock vanes in the form of traditional cross vanes or J-hook vanes will be installed to provide grade control, bank protection, and to increase pool habitat along SHC. Boulder steep structures

will be used on the Davis UT3 to provide grade control and to step the channel down in elevation through a segment that has a slope > 10%.

10.2 Riparian Buffer Vegetation

Temporary and permanent seed mixtures will be applied to all disturbed areas of the project site (Appendix F; Sheet 21). Temporary seeding will be applied to all disturbed areas including channel banks and floodplain benches inside the conservation as well access roads and spoil sites outside the easement. Temporary seeding mixtures will be applied at a rate of 60 lbs/ac. Permanent seeding will consist of a mixture of herbaceous perennials native to the project area and known to work well along restored stream channels. Permanent seed mixtures will be applied at a rate of 15 lbs/ac.

Nine-bark *Physocarpus opulifolius*, silky dogwood *Cornus amomum*, and silky willow *Salix sericea* will be installed as live-stakes along the stream banks just above and below the bankfull elevation (Appendix F; Sheet 21). Lives stakes will be spaced two to three apart utilization a diamond shaped installation pattern. Live stakes will be installed at a density of ≈130 stems/ac.

Bare-root and containerized woody shrubs and trees will be installed during the dormant season at a minimum rate of 320 stems/ac (Appendix F; Sheet 21). Species selection will consist of those common to native plant communities in the project area. A total of 20 shrub and small tree species, 12 medium tree species, and 9 large tree species were selected to revegetate the conservation easement areas following construction. Shrub and tree selections ranged from species tolerant (obligate wetland) to weakly tolerant of flooding (facultative upland). Shrubs and trees will be matched with one of four planting zones based on a species wetness tolerance. Planting zones will typically range from wet areas with saturated soils to upland areas where the soils are better drained.

10.3 On-Site Invasive Species Management

During construction and prior to the revegetation of the USH mitigation site, non-native plant species will be removed from within the conservation easement boundary. Non-native species commonly present within the project area include multiflora rose *Rosa multiflora*, oriental bittersweet *Celastrus orbiculatus*, Japanese honeysuckle *Lonicera japonica*, and Chinese privet *Ligustrum sinense*. Non-native plant control will be conducted using mechanical, chemical, and hand labor processes. Non-native species management will continue throughout the 5-year post construction monitoring period. Non-native pasture grass or fescue (*Festuca sp*.) is also present across the site. Fescue will be treated with glyphosate in areas where mechanical removal is not desirable during construction. Areas with fescue will be treated prior to the establishment of desirable native vegetation.

11 Performance Criteria

Monitoring protocols and performance criteria will follow what is outlined in the NCEEP site specific mitigation plan for the USH mitigation site and the USACE Stream Mitigation Guidelines (USACE 2003). Site monitoring will consist of data collection, analysis, and

reporting on channel stability and survival of riparian vegetation and will be conducted on an annual basis for a minimum of 5 years post construction.

11.1 Stream Monitoring

Monitoring will include quantification of channel stability including cross-sectional (dimension), pattern, longitudinal profile, and bed material measurements. Fixed station photographic points will be established to provide visual comparison of channel banks, in-stream structures, and other morphological features over time. Bankfull flow events will be monitored using a simple crest gauge. A minimum of two bankfull events, occurring in separate calendar years, shall be documented during the 5 year monitoring period. Otherwise, stream monitoring will be continued.

11.2 Vegetation Monitoring

Quantitative vegetation monitoring plots will be established in buffer restoration areas following native plant installations in accordance with established NCEEP/CVS protocols (Lee et al 2006). Vegetation plots will be evaluated to ascertain the performance and density of planted woody stems. Permanent fixed point photo stations will be established to provide a visual record of each plot over time. Minimum success criteria, established by USACE (2003), for planted woody vegetation is 260 stems/ac during the year-5 monitoring period.

11.3 Schedule and Reporting

The NCWRC will prepare the Baseline Monitoring Document (BMD) following the most recent version of the NCEEP standards and guidelines and will be submitted within 90 days following native vegetation planting. The BMD will include documentation of the mitigation sites pre-existing morphological condition, as well as design values, and a quantitative summary of the post construction (as-built) morphological and vegetative project elements. The BMD will also include photographic documentation of the site in the as-built condition. Yearly monitoring reports will build upon the data tables, graphs, and photographs reported in the BMD.

Monitoring reports will provide a discussion of any significant deviations from the as-built conditions as well as the potential for mitigation site to meet success criteria for channel stability and vegetation survival at the end of the 5-year monitoring period. Monitoring Reports will be submitted annually and no later than December 31st of each monitoring year.

12 Acknowledgements

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stream and wetland delineations, archaeology surveys, and the FEMA flood study and no-rise certification approval.

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Appendix A

General Tables and Figures.

Table A.1 Upper South Hominy Mitigation Site Project Components.

Upper South Hominy Mitigation Site Project Components							
Project Segment or Reach ID	**Existing Feet/Acres**	**Restoration Level[a]**	**Approach[b]**	**Restored Feet/Acres**	**Stationing**	**Riparian Buffer Acres[c]**	**Comment**
Bianculli South Hominy Cr.	600	R	P3		0+00 to 6+00		Mainstem South Hominy Cr. (SHC)
Bianculli South Hominy Cr.	169	EII	P3		6+00 to 7+69		Mainstem South Hominy Cr
Bianculli Trib North (UT1)	100	P			0+00 to 1+00		Spring above old chicken house
Bianculli Trib North (UT1)	138	R	P1		1+00 to 2+38		Spring below old chicken house
Bianculli Trib South (UT2)	44	R	P3		6+54 to 6+99		Spring portion near Bianculli drive
Bianculli Trib South (UT2)	654	EII	SS		0+00 to 6+54		Originates on south side of property
Bura South Hominy Cr.	477	R	P3		1+00 to 2+50; 7+25 to 9+75; 11+75 to 12+50		Mainstem South Hominy Cr
Bura South Hominy Cr.	775	EII	P3		0+00 to 1+00; 2+50 to 7+25; 9+75 to 11+75		Mainstem South Hominy Cr
Roberson Abandoned Ch.	170	R	P3		0+00 to 1+70		Reconnect with Bianculli spring - south
Davis South Hominy Cr.	500	EI	P3		0+00 to 5+00		Mainstem South Hominy Cr
Davis South Hominy Cr.	227	EII	P3		5+00 to 7+27		Mainstem South Hominy Cr
Davis UT3 upper	775	P			0+00 to 7+75		Upper portion unnamed trib - wooded
Davis UT3 middle	538	EII	SS		7+75 to 13+13		Above large chicken house - invasives
Davis UT3 lower	426	R	PI		13+13 to 17+39		Below UT ford to SHC confluence
Davis Springs (north)	138	P			0+00 to 1+38		Left bank of UT in Presv. section
Davis Spring (south)	72	P			0+00 to 0+72		Right bank of UT in Rest. section

Component Summations

Restoration Level	Stream (lf)	Riparian Wetland (Acre)		Non-Riparian Wetland (Acre)	Upland Wetland (Acre)	Buffer (Acre)	BMP
		Riverine	Non-Riverine				
Restoration	1,856						
Enhancement I	500						
Enhancement II	2,363	1.13					
Creation							
Preservation	1,085	0.22					
HQ Preservation							
Totals	**5,804**	**1.35**		**0.0**	**0.0**	**16.44**	**BMP Count**

= Non-Applicable

R = Restoration
EI = Enhancement I
P = Preservation
C = Creation
EII = Enhancement II
S = Stabilization
P1 = Priority 1
P2 = Priority 2
P3 = Priority 3
SS = Stream Bank Stabilization

[a]Source: USACE (2003)
[b]Source: Rosgen (2006)
[c]Defined as the area of the conservation easement measured post construction from the bankfull elevation nearest to the active stream channel to the easement boundary.

Table A.2 Upper South Hominy Mitigation Site Project Activity and Reporting History.

Upper South Hominy Mitigation Site Project Activity and Reporting History		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Conservation easement acquired (by NCEEP)	11 June 2009	11 June 2009
Mitigation Plan	23 January 2009	30 November 2010
Final Design - 90%	28 February 2010	30 November 2010
Construction		
Temporary S&E seed mix applied to entire project area		
Permanent seed mix applied to entire project area		
As-built physical survey		
Containerized plantings installed over entire project area		
As-built vegetation survey		
Mitigation Plan/As-built (Year 0 Monitoring - baseline)		
Year 1 Monitoring		
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5+ Monitoring		

Bolded items represent those events or deliverables that are variable. Non-bolded items represent events that are standard components over the course of a typical project

Table A.3 Upper South Hominy Mitigation Site Project Contacts.

Upper South Hominy Mitigation Site Project Contacts	
Project Owner NC Ecosystem Enhancement Program	**Contact Information** NC Ecosystem Enhancement Program Harry Tsomides 5 Ravenscroft Dr. Asheville, NC 28801
Designer(s): Jeff Ferguson Shannon Deaton	**Firm Information/Address:** North Carolina Wildlife Resources Commission 1751Varsity Drive NCSU Centennial Campus Raleigh, NC 27695
Construction Contractor:	**Firm Information/Address:**
Planting Contractor:	**Company Information/Address:**
Seeding Contractor: NCWRC **Seed Mix Sources** Ernst Conservation Seeds, LLP **Nursery Stock Suppliers** Carolina Native Nursery	**Company Information/Address:** Same as above **Company and Contact Phone:** 1-800-873-3321 **Company and Contact Phone:** 828-682-1471
Monitoring Performers: Stream Monitoring POC Vegetation Monitoring POC Wetland Monitoring POC	**Firm Information/Address:** Scott Loftis, NCWRC, same as above Scott Loftis, NCWRC, same as above

Table A.4 Upper South Hominy Mitigation Site Project Attributes.

Upper South Hominy Mitigation Site Project Attributes				
Project County	Buncombe			
Physiographic Region	Blue Ridge Mountains			
Ecoregion (Reference: USACE 2003)	Southern Crystalline Ridges and Mountains			
Project River Basin	French Broad River			
USGS HUC for Project (14 digit)	06010105060020			
NCDWQ Sub-basin for Project	04-03-02			
Within Extent of EEP Watershed Plan?	Yes			
NCWRC Class (Warm, Cool, Cold)	Cold			
Percent of project Easement Fenced or Demarcated	100%			
Beaver activity Observed During Design Phase?	Yes			
	SHC	UT3 (Davis)	Reach	Reach
Drainage Area (mi^2)	7.1	0.1		
Stream Order	4	1		
Restored Length (ft)	1077	426		
Perennial or Intermittent	Perennial	Perennial		
Watershed Type (Rural, Urban, Developing, etc.)	Developing	Developing		
Watershed LULC Distribution (e.g.) (percent)				
Residential	<3.0	Included in total		
Ag-Row Crop	0.2			
Ag-Livestock	7.2			
Forested	89.7			
Etc.				
Watershed Impervious Cover (percent)	<1.0	Included in total		
NCDWQ AU/Index Number	6-76-5	N/A		
NCDWQ Classification	C, Tr	C, Tr		
303d Listed?	No	No		
Upstream 303d Listed Segment?	No	No		
Reasons for 303d Listing or Stressor	N/A	N/A		
NCDWQ 404 Water Quality Certification Number	TBD	TBD		
USACE 401 Action ID Number	TBD	TBD		
Total Acreage of Conservation Easement (including stream channel)	16.44	Included in total		
Total (undisturbed) Vegetated Acreage Within Easement	7.5	Included in total		
Total Riparian Buffer Acreage as Part of the Restoration	7.0	Included in total		
Rosgen Stream Classification of Pre-Existing	C4	B4		
Rosgen Stream Classification of As-built (Design)	C4	B4		
Valley Type	VIII	VII		
Valley Slope	0.00973	0.10480		
Valley Side Slope Range (e.g. 2-3%)	0.09-0.24	0.07-0.29		
Valley Toe Slope Range (e.g. 2-3%)	0.003-0.026	0.02-0.19		
Cowardin Classification (Reference: Cowardin 1979)	N/A	N/A		
Trout Waters Designation (NCWRC)	No	No		
Species of Concern, Endangered, Etc.? (Y/N)	No	No		
Dominant Soil Series and Characteristics				
Series (dominant)	Iotla Loam	Included in total		
Depth (in)	80			
Clay (%)	15.5			
K	0.15			
T	5			

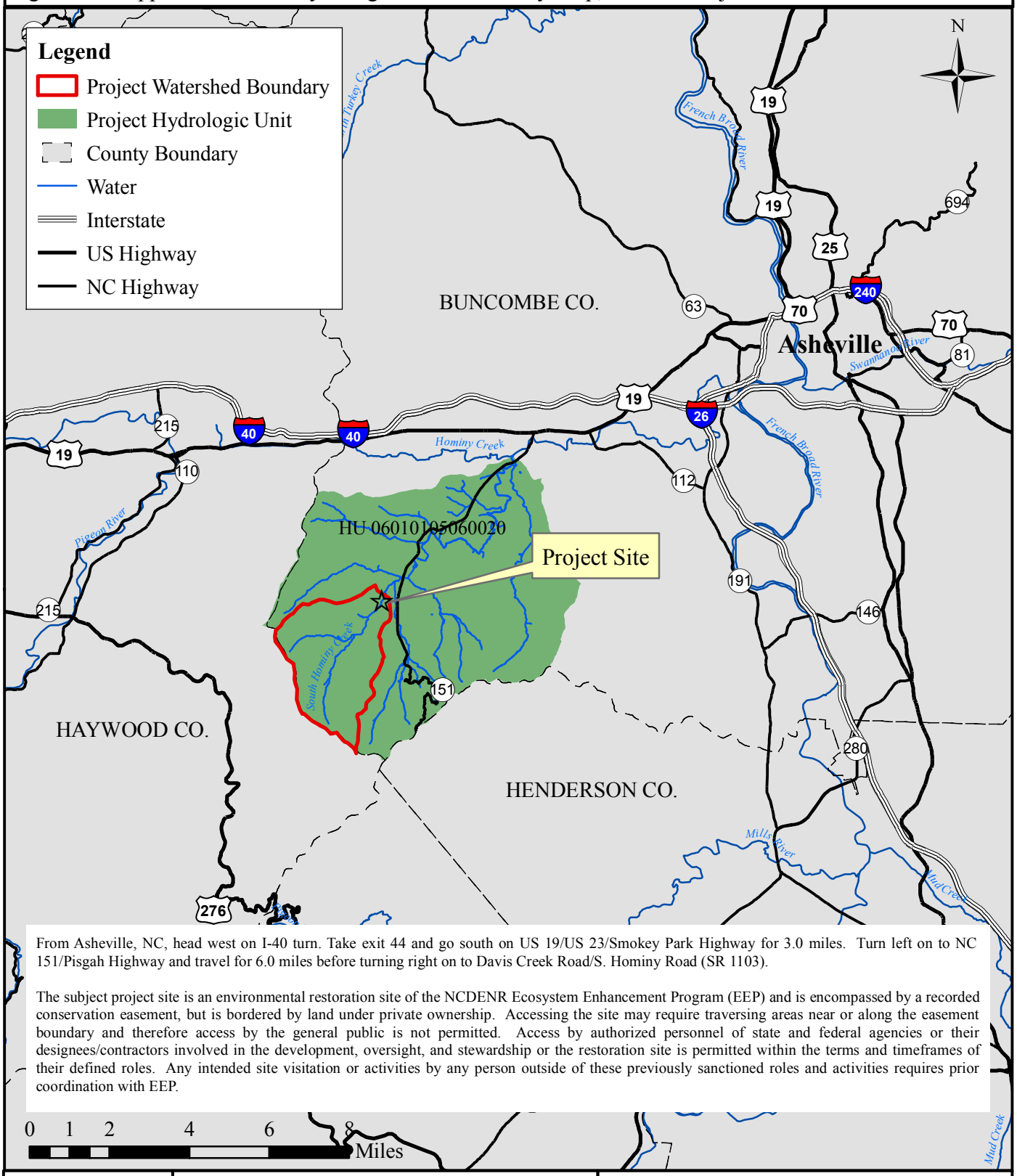
Table A.5 Upper South Hominy Soil Type Characteristics, NCEEP Project Number 92632.

Upper South Hominy Mitigation Site (NCEEP Project Number 92632										
Series Name	**Map Symbol**	**Percent Slope**	**Drainage Class**	**Hydric Class**	**Acres Area of Interest**	**Percent Area of Interest**	**Erosion Factor K**	**Erosion Factor T**	**Percent Clay**	**Percent OM**
Braddock clay/loam	BkD2	15-30%	well drained	Non-Hydric	0.2	0.8	0.20	5	37.7	0.57
Dillard loam	DrB	1-5%	moderately well drained	Non-Hydric	4.0	16.8	0.15	5	22.4	1.01
Evard -Cowee complex	EvD2	15-30%	well drained	Non-Hydric	1.6	6.8	0.20	4	21.7	0.32
Evard -Cowee complex	EwD	15-30%	well drained	Non-hydric	0.1	0.6	0.17	4	22.5	0.58
Evard -Cowee complex	EwE	30-50%	well drained	Non-Hydric	1.0	4.2	0.17	4	22.5	0.55
Iotla loam	IoA	0-2%	somewhat poorly drained	Hydric	13.1	55.1	0.15	5	15.5	1.35
Reddies sandy loam	RdA	0-3%	moderately well drained	Non-Hydric	0.2	0.7	0.05	3	5.8	1.36
Statler loam	StB	1-5%	well drained	Non-Hydric	0.7	2.8	0.10	5	26.7	1.22
Tate loam	TaC	8-15%	well drained	Non-Hydric	1.2	5.1	0.20	5	22.2	0.81
Tate loam	TaD	15-30%	well drained	Non-Hydric	0.2	0.7	0.20	5	22.2	0.81
Tate loam	TkD	15-30%	well drained	Non-Hydric	0.7	3.0	0.20	5	21.5	0.81
Unison loam	UnC	8-15%	well drained	Non-Hydric	0.8	3.5	0.17	5	38.3	0.83
Totals	12				23.9	100.0%				
Note: Project soil type map listed as Figure A 4.										
Note: Full soils report located in Appendix C										
Source: NRCS, USDS official soil series descriptions (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx; http://soildatamart.nrcs.usda.gov)										

Table A.6 Upper South Hominy Watershed Land Use Land Cover, NCEEP Project Number 92632.

Upper South Hominy Mitigation Site (NCEEP Project Number 92632)			
Land Cover Category	**Area ($m^{3)}$**	**Area (acres)**	**Percent of Area (%)**
Developed, Open Space	519,741.4	128.4	2.8
Developed, Low Intensity	7,621.7	1.9	<0.1
Deciduous Forest	1,635,3971.8	4041.1	89.2
Evergreen Forest	4,515.7	1.1	<0.1
Mixed Forest	61,189.0	15.1	0.3
Shrub/Scrub	10,805.8	2.7	0.1
Grassland/Herbaceous	85,180.6	21.1	0.5
Pasture/Hay	1,231,442.1	304.3	6.7
Cultivated Crops	41,392.2	10.2	0.2
Woody Wetlands	15,735.1	3.9	0.1
Total	18,331,595.2	4529.8	100.0

Figure A.1 Upper South Hominy Mitigation Site Vicinity Map, NCEEP Project Number 92632.



From Asheville, NC, head west on I-40 turn. Take exit 44 and go south on US 19/US 23/Smokey Park Highway for 3.0 miles. Turn left on to NC 151/Pisgah Highway and travel for 6.0 miles before turning right on to Davis Creek Road/S. Hominy Road (SR 1103).

The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight, and stewardship or the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activities by any person outside of these previously sanctioned roles and activities requires prior coordination with EEP.

Ecosystem Enhancement Program

Project Vicinity Map

Upper South Hominy Mitigation Site
EEP Project Number: 92632
Buncombe County, North Carolina
February 2010

Map Insert

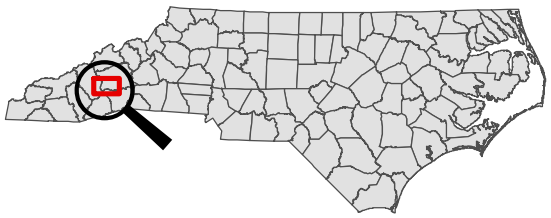
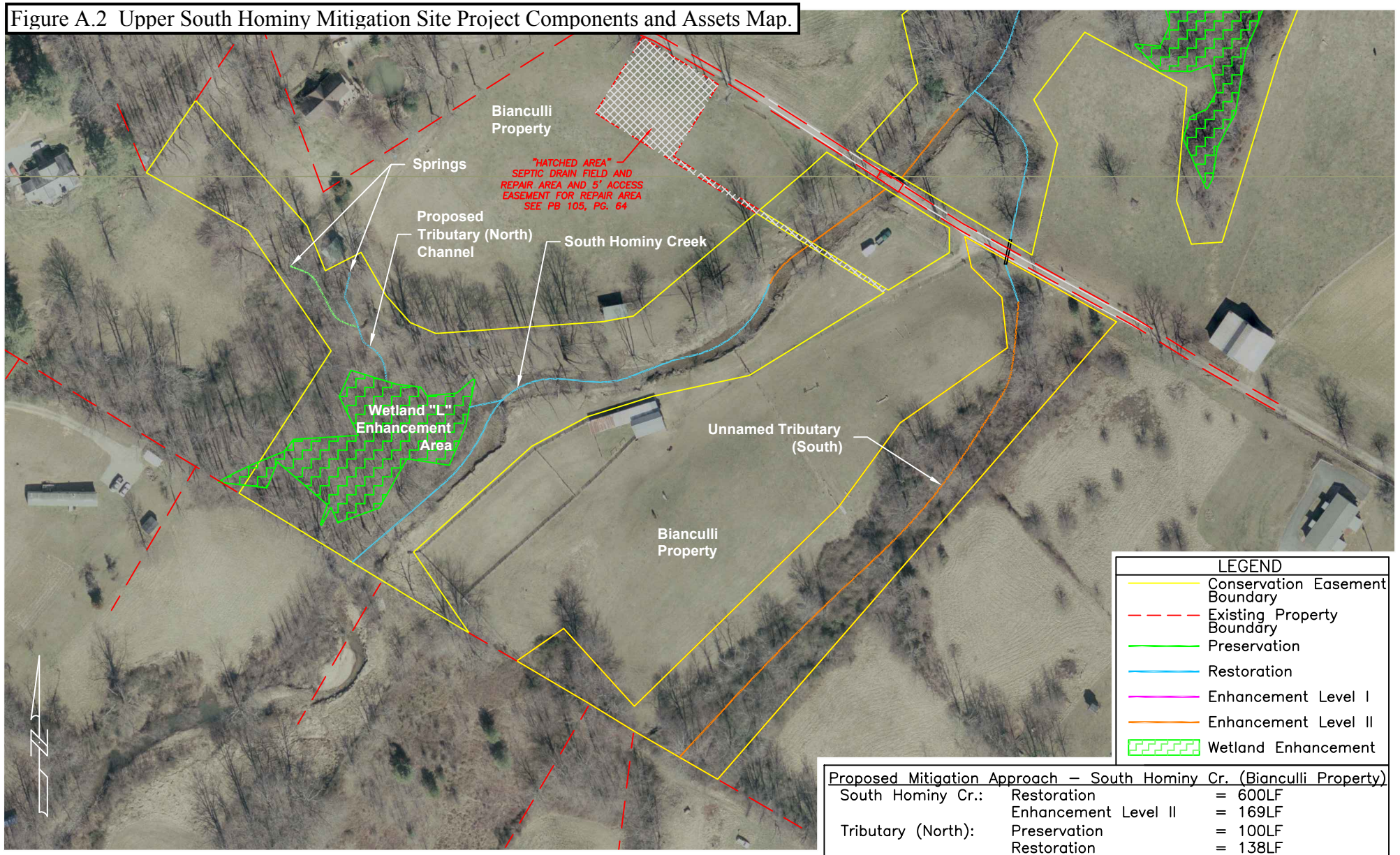
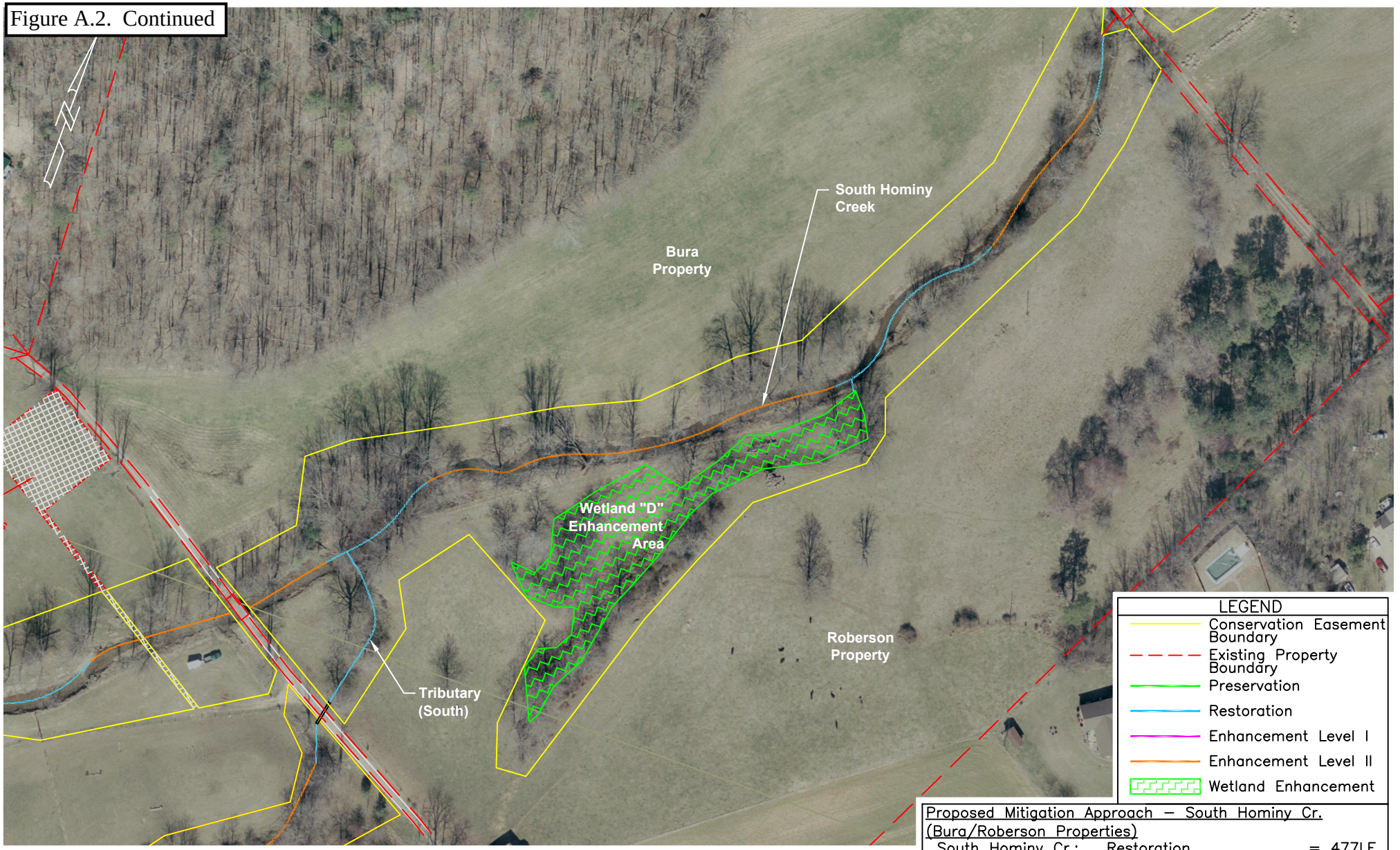


Figure A.2 Upper South Hominy Mitigation Site Project Components and Assets Map.



South Hominy Creek Mitigation Components
EEP Project No.: 92632 Buncombe County, NC
Bianculli Property Reach

Figure A.2. Continued



Proposed Mitigation Approach – South Hominy Cr. (Bura/Roberson Properties)

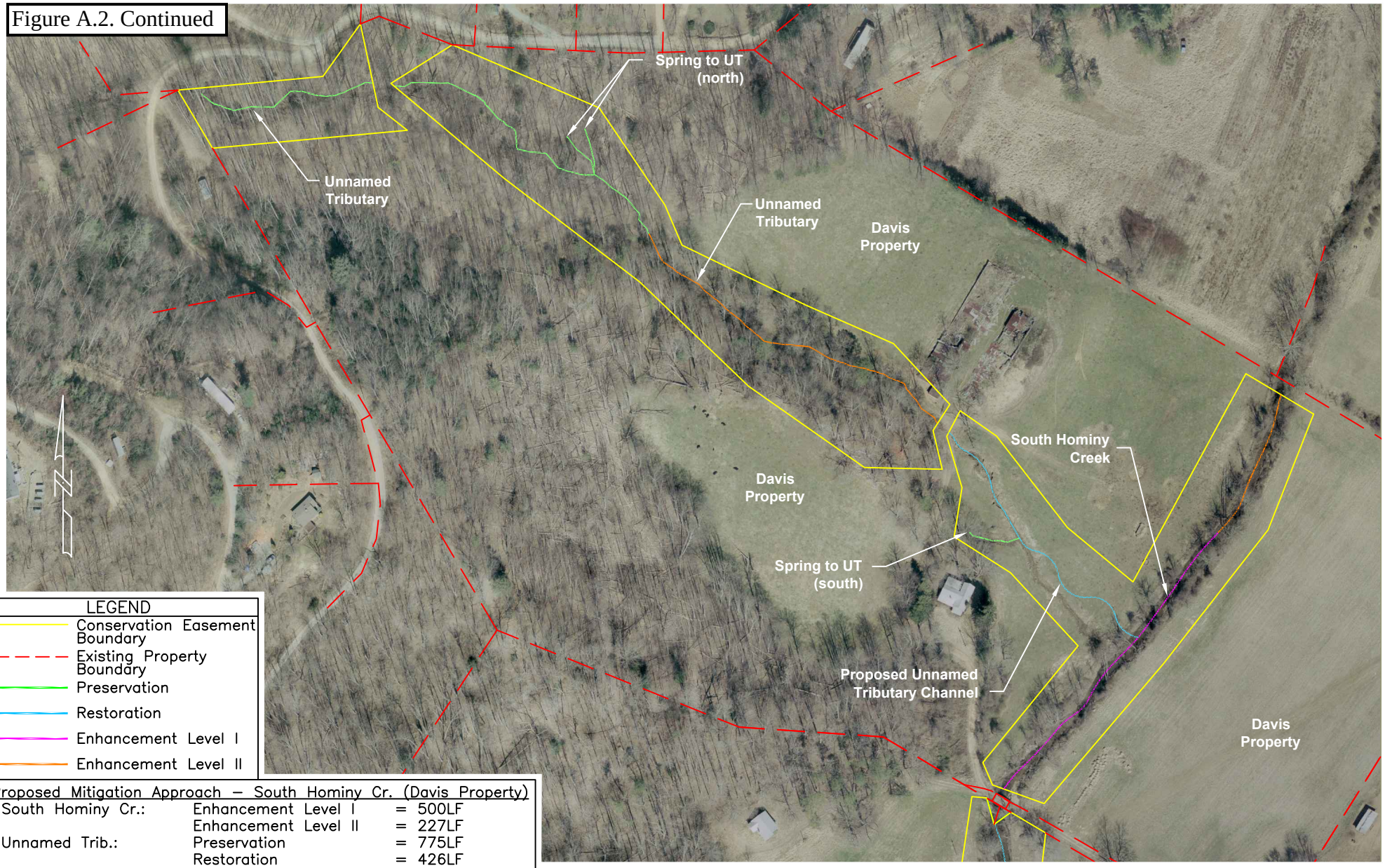
South Hominy Cr.:	Restoration	= 477LF
	Enhancement Level II	= 775LF
Tributary (South):	Restoration	= 170LF
Wetland Area "D"	Wetland Enhancement	= 0.69Ac.

Ecosystem Enhancement Program

South Hominy Creek Mitigation Components
EEP Project No.: 92632 Buncombe County, NC
Bura/Roberson Properties Reach

North Carolina Wildlife Resources Commission

Figure A.2. Continued



Proposed Mitigation Approach – South Hominy Cr. (Davis Property)

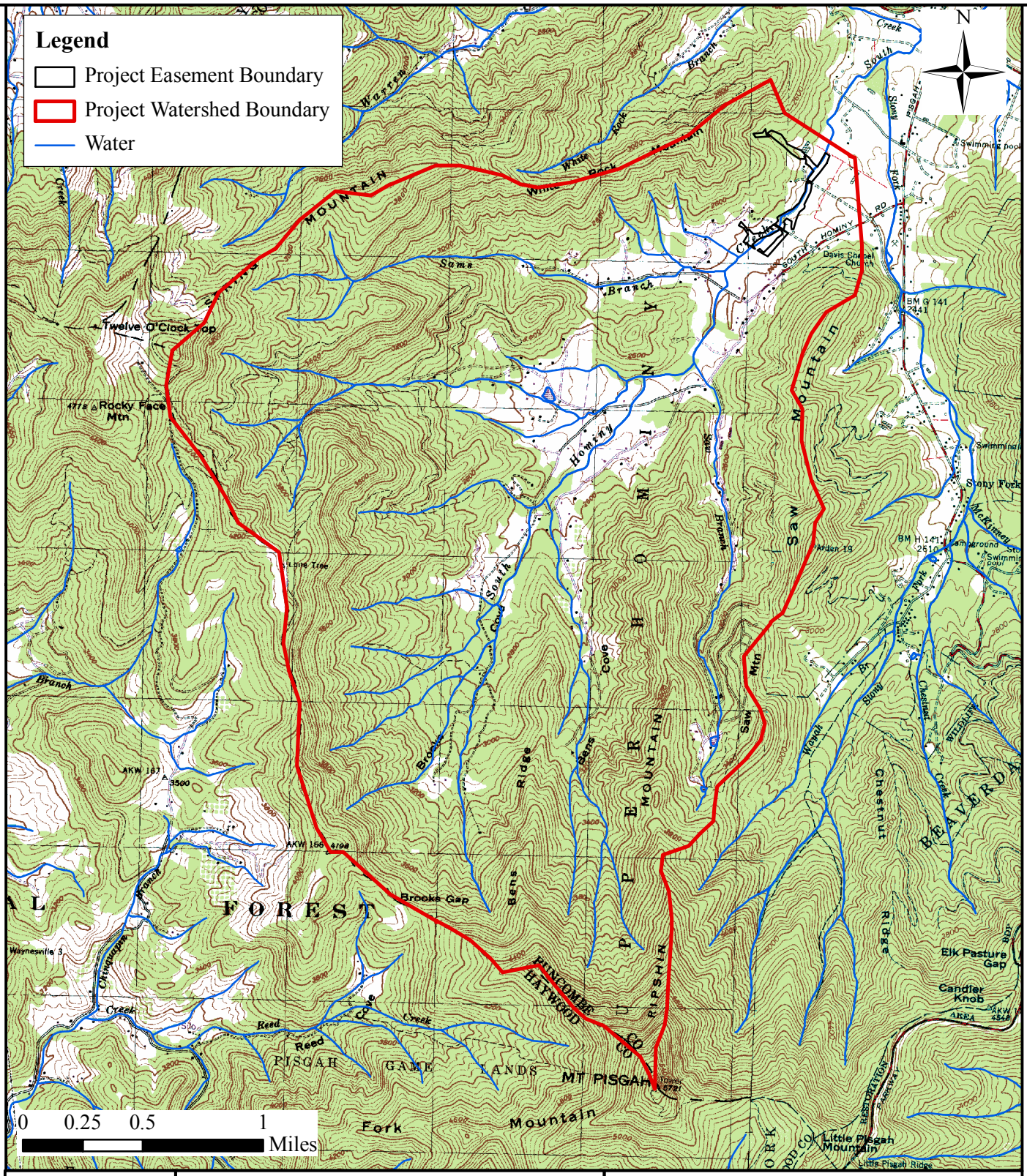
South Hominy Cr.:	Enhancement Level I	= 500LF
	Enhancement Level II	= 227LF
Unnamed Trib.:	Preservation	= 775LF
	Restoration	= 426LF
	Enhancement Level II	= 538LF
Springs to UT (north):	Preservation	= 138LF
Springs to UT (south):	Preservation	= 72LF

Ecosystem Enhancement Program

South Hominy Creek Mitigation Components
EEP Project No.: 92632 Buncombe County, NC
Davis Properties Reach

North Carolina Wildlife Resources Commission

Figure A.3 Upper South Hominy Watershed Boundary and Project Area Map, NCEEP Project Number 92632.



Project Watershed Boundary Map

Upper South Hominy Mitigation Site
EEP Project Number: 92632
Buncombe County, North Carolina
February 2010

Map Insert

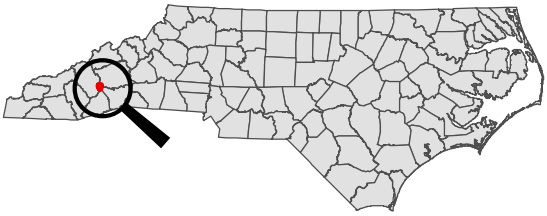
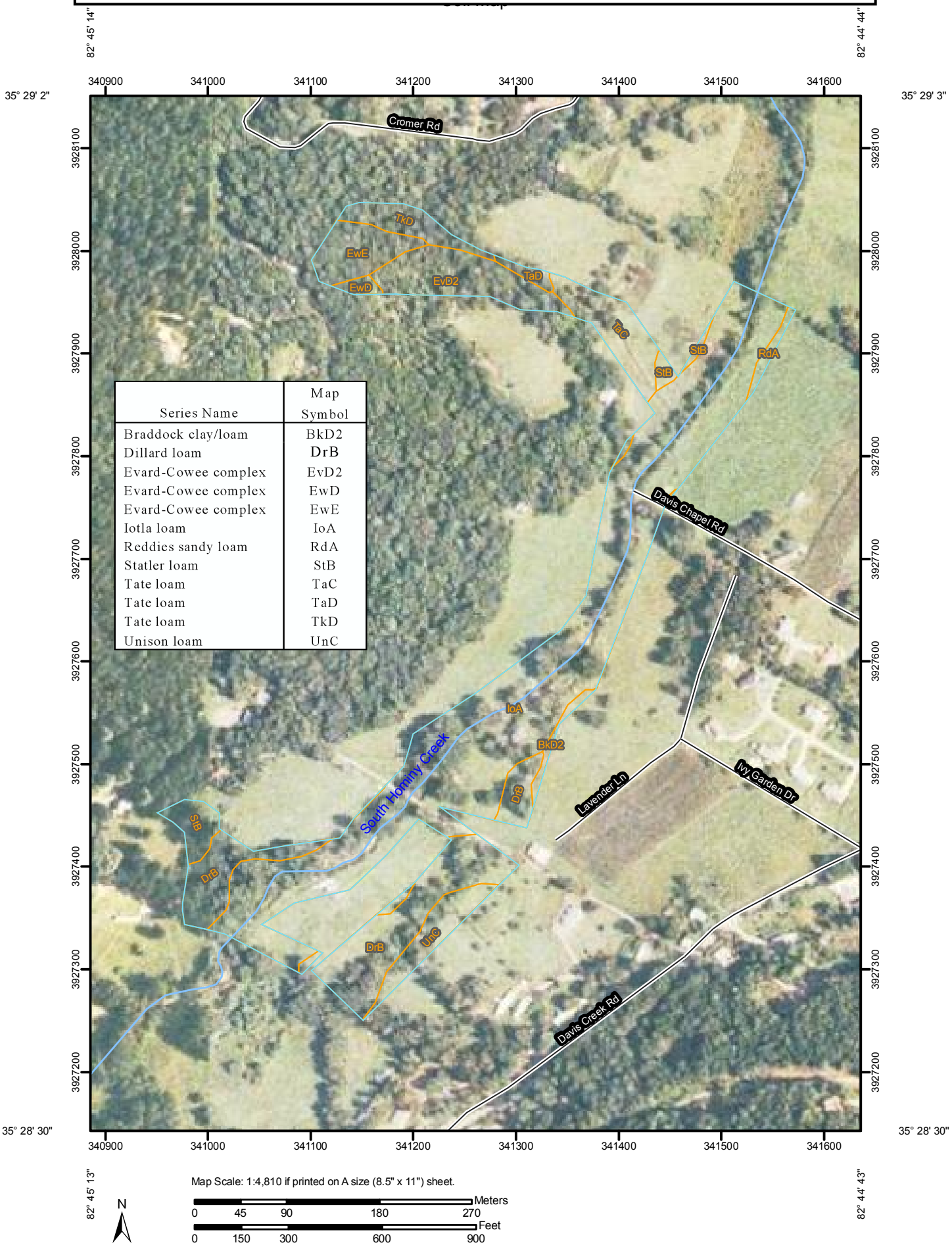


Figure A.4 Upper South Hominy Mitigation Site Soils Map, NCEEP Project Number 92632.



Appendix B

North Carolina Division of Water Quality Stream Identification Form, Version 3.1

United States Army Corps of Engineers Stream Quality Assessment Worksheet

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: Oct. 2009/March 2010	Project: Upper South Hominy	Latitude: 35.483022
Evaluator: Rebekah Newton	Site: Stream A and B; Upstream of ford.	Longitude: 82.750606
Total Points: 39 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County: Buncombe	Other: Dunsmore Mt and Cruso e.g. Quad Name:

A. Geomorphology (Subtotal = 20.5)	**Absent**	**Weak**	**Moderate**	**Strong**
1. Continuous bed and bank*	0	1	2	3✓
2. Sinuosity	0	1	2✓	3
3. In-channel structure: riffle-pool sequence	0	1	2	3✓
4. Soil texture of stream substrate sorting	0	1	2✓	3
5. Active/relic floodplain	0	1	2	3✓
6. Depositional bars and benches	0	1	2✓	3
7. Braided channel	0✓	1	2	3
8. Recent alluvial deposits	0	1✓	2	3
9. Natural levees*	0	1✓	2	3
10. Headcuts	0	1✓	2	3
11. Grade controls	0	0.5	1✓	1.5
12. Natural valley or drainageway	0	0.5	1	1.5✓
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0✓		Yes = 3	

*Man-made ditches are not rated; see discussion in manual

B. Hydrology (Subtotal = 9)

14. Groundwater flow/discharge	0	1	2	3✓
15. Water in channel an > 48 hrs since rain, **or** Water in channel – dry or growing season	0	1	2✓	3
16. Leaflitter	1.5	1✓	0.5	0
17. Sediment on plants or debris	0	0.5✓	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1✓	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5✓	

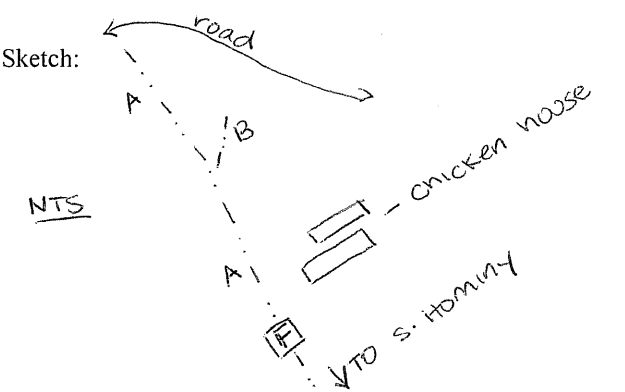
C. Biology (Subtotal = 9.5)

20. Fibrous roots in channel**	3	2✓	1	0
21. Rooted plants in channel**	3✓	2	1	0
22. Crayfish	0	0.5✓	1	1.5
23. Bivalves	0	1✓	2	3
24. Fish	0✓	0.5	1	1.5
25. Amphibians	0	0.5	1✓	1.5
26. Macrobenthos (note diversity and abundance)	0	0.5	1✓	1.5
27. Filamentous algae; periphyton	0	1✓	2	3
28. Iron oxidizing bacteria/fungus	0✓	1	2	3
29. Wetland plants in stream bed**	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2; Other = 0✓			

**Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes:

Sketch:



North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: Oct. 2009/March 2010	Project: Upper South Hominy	Latitude: 35.4817498
Evaluator: Rebekah Newton	Site: Stream A; Downstream of ford.	Longitude: 82.748257
Total Points: 25.5 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County: Buncombe	Other: Dunsmore Mt and Cruso e.g. Quad Name:

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank*	0	1	2	3✓
2. Sinuosity	0	1✓	2	3
3. In-channel structure: riffle-pool sequence	0✓	1	2	3
4. Soil texture of stream substrate sorting	0	1✓	2	3
5. Active/relic floodplain	0	1	2✓	3
6. Depositional bars and benches	0	1	2✓	3
7. Braided channel	0	1✓	2	3
8. Recent alluvial deposits	0	1✓	2	3
9. Natural levees*	0✓	1	2	3
10. Headcuts	0	1✓	2	3
11. Grade controls	0	0.5✓	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5✓
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0✓		Yes = 3	

*Man-made ditches are not rated; see discussion in manual

B. Hydrology (Subtotal = 8)				
14. Groundwater flow/discharge	0	1	2✓	3
15. Water in channel an > 48 hrs since rain, **or** Water in channel – dry or growing season	0	1	2✓	3
16. Leaflitter	1.5	1✓	0.5	0
17. Sediment on plants or debris	0	0.5	1✓	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5✓	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5✓	

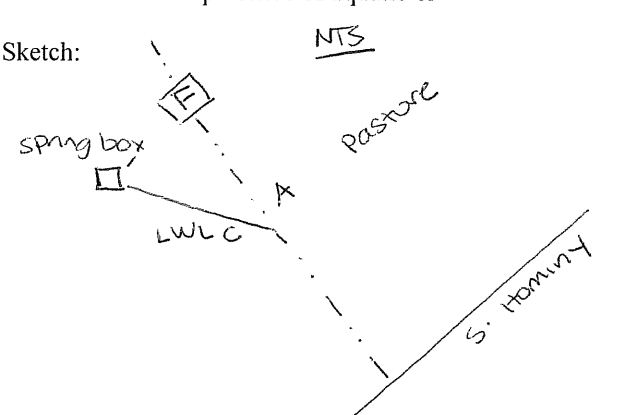
C. Biology (Subtotal = 3.5)				
20. Fibrous roots in channel**	3	2	1	0✓
21. Rooted plants in channel**	3	2	1	0✓
22. Crayfish	0✓	0.5	1	1.5
23. Bivalves	0✓	1	2	3
24. Fish	0✓	0.5	1	1.5
25. Amphibians	0✓	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0✓	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2✓	3
28. Iron oxidizing bacteria/fungus	0✓	1	2	3
29. Wetland plants in stream bed**	FAC = 0.5; FACW = 0.75; OBL = 1.5✓; SAV = 2; Other = 0			

**Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes:

This section of Stream A has been straightened and ditched, which has removed many of the natural stream characteristics that would be present otherwise. Stream A upstream of the ford is a good quality perennial stream. The lower section of Stream A is perennial as well. It is the opinion of CEC that this stream segment lacks some of the characteristics of a perennial stream because of the past manipulation and the effects that has had on stream quality (which effects biological characteristics) and stream morphology.

Sketch:



North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: Oct. 2009/March 2010	Project: Upper South Hominy	Latitude: 35.476487
Evaluator: Rebekah Newton	Site: Stream F	Longitude: 82.750564
Total Points: 31 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County: Buncombe	Other: Dunsmore Mt and Cruso e.g. Quad Name:

A. Geomorphology (Subtotal = 16)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank*	0	1	2✓	3
2. Sinuosity	0	1✓	2	3
3. In-channel structure: riffle-pool sequence	0	1✓	2	3
4. Soil texture of stream substrate sorting	0	1✓	2	3
5. Active/relic floodplain	0	1	2	3✓
6. Depositional bars and benches	0	1	2✓	3
7. Braided channel	0	1✓	2	3
8. Recent alluvial deposits	0	1✓	2	3
9. Natural levees*	0	1✓	2	3
10. Headcuts	0	1✓	2	3
11. Grade controls	0	0.5	1✓	1.5
12. Natural valley or drainageway	0	0.5	1✓	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0✓		Yes = 3	

*Man-made ditches are not rated; see discussion in manual

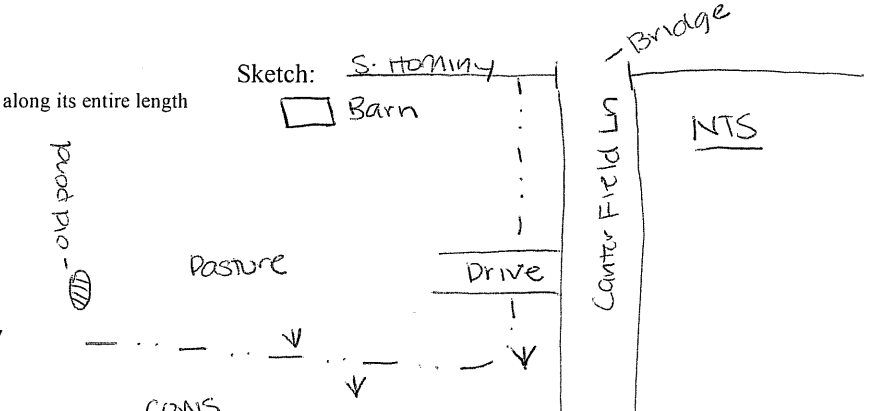
B. Hydrology (Subtotal = 8)				
14. Groundwater flow/discharge	0	1	2✓	3
15. Water in channel an > 48 hrs since rain, **or** Water in channel – dry or growing season	0	1	2✓	3
16. Leaflitter	1.5	1	0.5✓	0
17. Sediment on plants or debris	0	0.5	1✓	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1✓	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5✓	

C. Biology (Subtotal = 7)				
20. Fibrous roots in channel**	3	2✓	1	0
21. Rooted plants in channel**	3	2	1✓	0
22. Crayfish	0	0.5✓	1	1.5
23. Bivalves	0	1✓	2	3
24. Fish	0✓	0.5	1	1.5
25. Amphibians	0✓	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0✓	0.5	1	1.5
27. Filamentous algae; periphyton	0	1✓	2	3
28. Iron oxidizing bacteria/fungus	0✓	1	2	3
29. Wetland plants in stream bed**	FAC = 0.5; FACW = 0.75; OBL = 1.5✓; SAV = 2; Other = 0			

**Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes:
Stream F flows adjacent to a pasture and driveway along its entire length within the project boundary.

Sketch:



Date: Oct. 2009/March 2010	Project: Upper South Hominy	Latitude: 35.477312
Evaluator: Rebekah Newton	Site: Stream M	Longitude: 82.751990
Total Points: 33 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County: Buncombe	Other: Dunsmore Mt and Cruso e.g. Quad Name:

A. Geomorphology (Subtotal = 16.5)	**Absent**	**Weak**	**Moderate**	**Strong**
1. Continuous bed and bank*	0	1	2	3✓
2. Sinuosity	0	1	2✓	3
3. In-channel structure: riffle-pool sequence	0	1	2✓	3
4. Soil texture of stream substrate sorting	0	1	2✓	3
5. Active/relic floodplain	0	1✓	2	3
6. Depositional bars and benches	0	1✓	2	3
7. Braided channel	0✓	1	2	3
8. Recent alluvial deposits	0	1✓	2	3
9. Natural levees*	0	1	2✓	3
10. Headcuts	0	1✓	2	3
11. Grade controls	0	0.5✓	1	1.5
12. Natural valley or drainageway	0	0.5	1✓	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0✓		Yes = 3	

*Man-made ditches are not rated; see discussion in manual

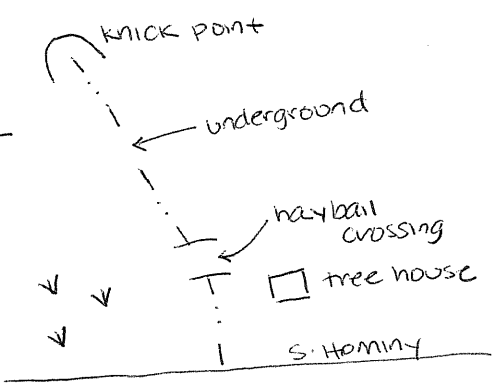
B. Hydrology (Subtotal = 8.5)				
14. Groundwater flow/discharge	0	1	2	3✓
15. Water in channel an > 48 hrs since rain, **or** Water in channel – dry or growing season	0	1	2✓	3
16. Leaflitter	1.5	1	0.5✓	0
17. Sediment on plants or debris	0	0.5✓	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1✓	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5✓	

C. Biology (Subtotal = 8)				
20. Fibrous roots in channel**	3	2✓	1	0
21. Rooted plants in channel**	3✓	2	1	0
22. Crayfish	0	0.5	1✓	1.5
23. Bivalves	0	1✓	2	3
24. Fish	0✓	0.5	1	1.5
25. Amphibians	0✓	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0✓	0.5	1	1.5
27. Filamentous algae; periphyton	0	1✓	2	3
28. Iron oxidizing bacteria/fungus	0✓	1	2	3
29. Wetland plants in stream bed**	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2; Other = 0✓			

**Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes:

Sketch:



Date: Oct. 2009/March 2010	Project: Upper South Hominy	Latitude: 35.480202
Evaluator: Rebekah Newton	Site: Main stem of South Hominy	Longitude: 82.748173
Total Points: 45.5 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County: Buncombe	Other: Dunsmore Mt and Cruso e.g. Quad Name:

A. Geomorphology (Subtotal = 23.5)	**Absent**	**Weak**	**Moderate**	**Strong**
1. Continuous bed and bank*	0	1	2	3✓
2. Sinuosity	0	1	2✓	3
3. In-channel structure: riffle-pool sequence	0	1	2	3✓
4. Soil texture of stream substrate sorting	0	1	2	3✓
5. Active/relic floodplain	0	1	2	3✓
6. Depositional bars and benches	0	1	2✓	3
7. Braided channel	0✓	1	2	3
8. Recent alluvial deposits	0	1✓	2	3
9. Natural levees*	0	1✓	2	3
10. Headcuts	0✓	1	2	3
11. Grade controls	0	0.5	1✓	1.5
12. Natural valley or drainageway	0	0.5	1	1.5✓
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3✓	

*Man-made ditches are not rated; see discussion in manual

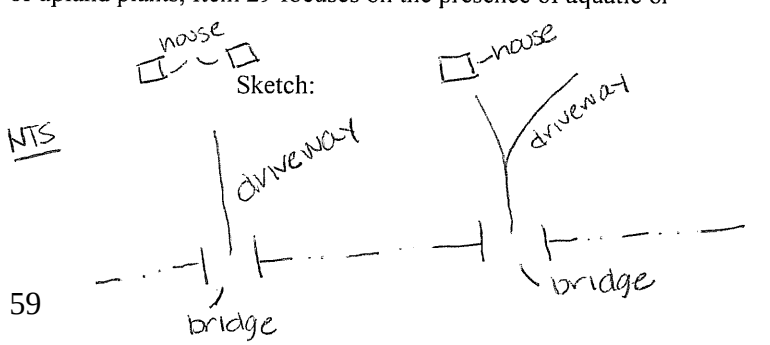
B. Hydrology (Subtotal = 10.5)				
14. Groundwater flow/discharge	0	1	2	3✓
15. Water in channel an > 48 hrs since rain, **or** Water in channel – dry or growing season	0	1	2	3✓
16. Leaflitter	1.5✓	1	0.5	0
17. Sediment on plants or debris	0	0.5✓	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1✓	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5✓	

C. Biology (Subtotal = 11.5)				
20. Fibrous roots in channel**	3✓	2	1	0
21. Rooted plants in channel**	3✓	2	1	0
22. Crayfish	0	0.5	1✓	1.5
23. Bivalves	0	1✓	2	3
24. Fish	0	0.5	1✓	1.5
25. Amphibians	0	0.5✓	1	1.5
26. Macrobenthos (note diversity and abundance)	0	0.5	1✓	1.5
27. Filamentous algae; periphyton	0	1✓	2	3
28. Iron oxidizing bacteria/fungus	0✓	1	2	3
29. Wetland plants in stream bed**	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2; Other = 0✓			

**Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes:

Sketch:



USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Upper Hominy **2.** Evaluator's name: Rebekah Newton

3. Date of evaluation: Oct. 2009/March 2010 **4.** Time of evaluation: morning

5. Name of stream: UT South Hominy Creek **6.** River basin: French Broad River Basin

7. Approximate drainage area: +/- 55 Acres **8.** Stream order: First Order

9. Length of reach evaluated: Approx. 100 LF **10.** County: Buncombe

11. Site coordinates (if known): 35.483022; 82.750606 **12.** Subdivision name (if any): n/a

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):

Stream A and B; upstream of ford.

14. Proposed channel work (if any): Restoration, enhancement, or preservation.

15. Recent weather conditions: Cool, rainy.

16. Site conditions at time of visit: Cool, dry.

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat

X Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed _(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area:_____

19. Does channel appear on USGS quad map? YES NO **20.** Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 10 % Residential ___% Commercial ___% Industrial 5 % Agricultural

75 % Forested 10 % Cleared / Logged ___% Other (_____)

22. Bankfull width: 3-4 feet **23**. Bank height (from bed to top of bank): 1 foor

24. Channel slope down center of stream: ___Flat (0 to 2%) ___Gentle (2 to 4%) X Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: ____Straight X Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 65 **Comments:**_____.

Evaluator's Signature_____ **Date**_____

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STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	4
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	5
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	5
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	5
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	0
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						65

* These characteristics are not assessed in coastal streams.

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Upper Hominy **2.** Evaluator's name: Rebekah Newton

3. Date of evaluation: Oct. 2009/March 2010 **4.** Time of evaluation: morning

5. Name of stream: UT South Hominy Creek **6.** River basin: French Broad River Basin

7. Approximate drainage area: +/- 75 Acres **8.** Stream order: First Order

9. Length of reach evaluated: Approx. 100 LF **10.** County: Buncombe

11. Site coordinates (if known): 35.4817498; 82.748257 **12.** Subdivision name (if any): n/a

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):

Stream A; downstream of ford.

14. Proposed channel work (if any): Restoration, enhancement, or preservation.

15. Recent weather conditions: Cool, rainy.

16. Site conditions at time of visit: Cool, dry.

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat

X Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed __(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area:_____

19. Does channel appear on USGS quad map? YES NO **20.** Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 10 % Residential ___% Commercial ___% Industrial 5 % Agricultural

65 % Forested 20 % Cleared / Logged ___% Other (_____)

22. Bankfull width: 3-4 feet **23**. Bank height (from bed to top of bank): 4 feet

24. Channel slope down center of stream: X Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: X Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 26 **Comments:**_____.

Evaluator's Signature_____ **Date**_____

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STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	0
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	0
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	0
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	0
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						26

* These characteristics are not assessed in coastal streams.

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Upper Hominy **2.** Evaluator's name: Rebekah Newton

3. Date of evaluation: Oct. 2009/March 2010 **4.** Time of evaluation: morning

5. Name of stream: UT South Hominy Creek **6.** River basin: French Broad River Basin

7. Approximate drainage area: +/- 105 Acres **8.** Stream order: First Order

9. Length of reach evaluated: Approx. 100 LF **10.** County: Buncombe

11. Site coordinates (if known): 35.476487; 82.750564 **12.** Subdivision name (if any): n/a

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): Stream F.

14. Proposed channel work (if any): Restoration, enhancement, or preservation.

15. Recent weather conditions: Cool, rainy.

16. Site conditions at time of visit: Cool, dry.

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat

X Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed _(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area:_____

19. Does channel appear on USGS quad map? YES NO **20.** Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 10 % Residential ___% Commercial ___% Industrial 5 % Agricultural

45 % Forested 40 % Cleared / Logged ___% Other (_____)

22. Bankfull width: 3-4 feet **23**. Bank height (from bed to top of bank): 1 foot

24. Channel slope down center of stream: X Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: X Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 43 **Comments:**_____.

Evaluator's Signature_____ **Date**_____

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	4
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						43

* These characteristics are not assessed in coastal streams.

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Upper Hominy **2.** Evaluator's name: Rebekah Newton

3. Date of evaluation: Oct. 2009/March 2010 **4.** Time of evaluation: morning

5. Name of stream: UT South Hominy Creek **6.** River basin: French Broad River Basin

7. Approximate drainage area: +/- 25 Acres **8.** Stream order: First Order

9. Length of reach evaluated: Approx. 100 LF **10.** County: Buncombe

11. Site coordinates (if known): 35.477312; 82.751990 **12.** Subdivision name (if any): n/a

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): Stream M.

14. Proposed channel work (if any): Restoration, enhancement, or preservation.

15. Recent weather conditions: Cool, rainy.

16. Site conditions at time of visit: Cool, dry.

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat

X Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed _(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area:_____

19. Does channel appear on USGS quad map? YES NO **20.** Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 10 % Residential ___% Commercial ___% Industrial 5 % Agricultural

50 % Forested 35 % Cleared / Logged ___% Other (_____)

22. Bankfull width: 3-4 feet **23**. Bank height (from bed to top of bank): 2 feet

24. Channel slope down center of stream: ___Flat (0 to 2%) X Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: X Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 59 **Comments:**_____.

Evaluator's Signature_____ **Date**_____

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	4
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						59

* These characteristics are not assessed in coastal streams.

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Upper Hominy **2.** Evaluator's name: Rebekah Newton

3. Date of evaluation: Oct. 2009/March 2010 **4.** Time of evaluation: morning

5. Name of stream: UT South Hominy Creek **6.** River basin: French Broad River Basin

7. Approximate drainage area: +/- 850 Acres **8.** Stream order: Fourth Order

9. Length of reach evaluated: Approx. 100 LF **10.** County: Buncombe

11. Site coordinates (if known): 35.480202; 82.748173 **12.** Subdivision name (if any): n/a

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):

Main stem South Hominy Creek.

14. Proposed channel work (if any): Restoration, enhancement, or preservation.

15. Recent weather conditions: Cool, rainy.

16. Site conditions at time of visit: Cool, dry.

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat

X Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed __(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area:_____

19. Does channel appear on USGS quad map? YES NO **20.** Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 10 % Residential ___% Commercial ___% Industrial 5 % Agricultural

70 % Forested 15 % Cleared / Logged ___% Other (_____)

22. Bankfull width: 30 feet **23**. Bank height (from bed to top of bank): 7 feet

24. Channel slope down center of stream: ___Flat (0 to 2%) X Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: ____Straight X Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 62 **Comments:**_____.

Evaluator's Signature_____ **Date**_____

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	4
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	4
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	4
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						62

* These characteristics are not assessed in coastal streams.

Appendix C

Environmental Screening, Documentation, and Correspondence

Federally Listed Species in Buncombe County, North Carolina

TRC, Archeological Survey Report

SHPO Correspondence

THPO Correspondence

EDR, Inc. Radius Map Report with GEOCheck

Flood Study Report

Floodplain Development Permit Application and Correspondence

USDA Form AD-1006 Farm Land Conversion Impact Rating Form

Categorical Exclusion Form for NCEEP Projects, Version 1.4

Table C.1 Federally Listed Species Located in Buncombe County, North Carolina, USH Mitigation Site.

Common Name	Scientific Name	Federal Status
Vertebrate		
Allegheny woodrat	*Neotoma magister*	FSC
Appalachian Bewick's wren	*Thryomanes bewickii altus*	FSC
Bachman's sparrow	*Aimophila aestivalis*	FSC
Blotchside logperch	*Percina burtoni*	FSC
Bog turtle	*Clemmys muhlenbergii*	T (S/A)
Carolina northern flying squirrel	*Glaucomys sabrinus coloratus*	E
Cerulean warbler	*Dendroica cerulea*	FSC
Eastern puma (=cougar)	*Puma concolor couguar*	E
Eastern small-footed bat	*Myotis leibii*	FSC
Gray bat	*Myotis grisescens*	E
Hellbender	*Cryptobranchus alleganiensis*	FSC
Longhead darter	*Percina macrocephala*	FSC
Mountain blotched chub	*Erimystax insignis eristigma*	FSC
Northern saw-whet owl (Southern Appalachian population)	*Aegolius acadicus* pop. *1*	FSC
Paddlefish	*Polyodon spathula*	FSC
Pygmy salamander	*Desmognathus wrighti*	FSC
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	FSC
Red crossbill (Southern Appalachian)	*Loxia curvirostra*	FSC
Southern Appalachian black-capped chickadee	*Poecile atricapillus practicus*	FSC
Southern Appalachian eastern woodrat	*Neotoma floridana haematoreia*	FSC
Southern water shrew	*Sorex palustris punctulatus*	FSC
Spotfin chub (=turqoise shiner)	*Erimonax monachus*	T
Yellow-bellied sapsucker (Southern Appalachian population)	*Sphyrapicus varius appalachiensis*	FSC
Invertebrate:		
Appalachian elktoe	*Alasmidonta raveneliana*	E
Diana fritillary (butterfly)	*Speyeria diana*	FSC
French Broad crayfish	*Cambarus reburrus*	FSC
Southern Tawny Crescent butterfly	*Phyciodes batesii maconensis*	FSC
Tan riffleshell	*Epioblasma florentina walkeri* (=E. *walkeri)*	E

Table C.1 Continued

Vascular Plant:		
Blue Ridge Ragwort	*Packera millefolium*	FSC
Bunched arrowhead	*Sagittaria fasciculata*	E
Butternut	*Juglans cinerea*	FSC
Cain's reedgrass	*Calamagrostis cainii*	FSC
Darlington's spurge	*Euphorbia purpurea*	FSC
Fraser fir	*Abies fraseri*	FSC
Fraser's loosestrife	*Lysimachia fraseri*	FSC
French Broad heartleaf	*Hexastylis rhombiformis*	FSC
Gray's lily	*Lilium grayi*	FSC
Gray's saxifrage	*Saxifraga caroliniana*	FSC
Large-leaved Grass-of-Parnassus	*Parnassia grandifolia*	FSC
Mountain catchfly	*Silene ovata*	FSC
Mountain heartleaf	*Hexastylis contracta*	FSC
Mountain sweet pitcherplant	*Sarracenia rubra* ssp. *jonesii*	E
Piratebush	*Buckleya distichophylla*	FSC
Spreading avens	*Geum radiatum*	E
Sweet pinesap	*Monotropsis odorata*	FSC
Virginia spiraea	*Spiraea virginiana*	T
Lichen:		
Rock gnome lichen	*Gymnoderma lineare*	E

Table C.2 Federally Listed Species From the North Carolina Natural Heritage Program Found Within the USGS Dunsmore Mountain and Cruso Quadrangle Maps, USH Mitigation Site.

Common Name	**Scientific Name**	**Federal Status**
Appalachian Elktoe	*Alasmidonta raveneliana*	E
Carolina Northern Flying Squirrel	*Glaucomys sabrinus coloratus*	E
Bog Turtle	*Glyptemys muhlenbergii*	T(S/A)
Rock Gnome Lichen	*Gymnoderma lineare*	E
Gray Myotis	*Myotis grisescens*	E
Indiana Bat	*Myotis sodalis*	E
Eastern Cougar	*Puma concolor couguar*	E
Virginia spirea	*Virginia spiraea*	E

Table C.3 Federally Listed Species From the North Carolina Natural Heritage Program Found Within a Two Mile Radius of the USH Mitigation Site, USH Mitigation Site.

Common Name	**Scientific Name**	**Federal Status**
Virginia Spirea	*Virginia spiraea*	T

Figure C.1 TRC Correspondence and Documentation, NCEEP Project Number 92632.

TRC

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Suite 250
Chapel Hill, NC 27517

919.530.8446 PHONE
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October 26, 2009

Andrew Bick, PE
Confluence Engineering, PC
16 Broad Street
Asheville, NC 28801

Re: Cultural Resources Literature Review and Field Reconnaissance of the Upper South Hominy Creek Ecosystem Enhancement Project, Buncombe County, North Carolina

Dear Mr. Bick:

On behalf of Confluence Engineering, TRC has completed a background cultural resources literature review and field reconnaissance of the approximately 10-acre Upper South Hominy Creek ecosystem enhancement project in Buncombe County, North Carolina (Figure 1). The project area is composed of a 5,000 linear foot segment of Upper South Hominy Creek and four unnamed tributaries (designated as tributaries 1–4), and is located on the northwestern side of Davis Creek Road (SR 1103), approximately 0.3 mi (0.5 km) south of its intersection with the Pisgah Highway (NC 151). The area of potential effect (APE) is defined as the stream corridors and a non-encroachment area along each as defined by the Buncombe County Flood Insurance Study of 2007.

For purposes of the literature review, the area examined included a one-mile radius around the project area. Research was conducted on October 1, 2009 at the North Carolina Office of State Archaeology (OSA), and the North Carolina State Historic Preservation Office (SHPO), Survey and Planning Branch. The research included a review of maps and site files at the OSA for archaeological sites listed in or eligible for inclusion in the National Register of Historic Places (NRHP) and a review of maps and survey records relating to Buncombe County at the SHPO. Historic maps and documents on-line and in TRC's library were also consulted.

On October 5, 2009 TRC staff visually examined the project area. The surrounding area is primarily composed of agricultural fields and house yards in the areas south and east of Upper South Hominy Creek, while the areas adjacent to the creek and its tributaries as well as the west are lightly wooded with some secondary vegetation and woodland. TRC staff walked the entire project area in order to examine site conditions and assess the potential for significant cultural resources, with efforts concentrated along the creek and its tributaries and in an area to be potentially affected by rerouting of Tributary 2.

RESULTS

Literature Review

Archaeological Sites. A review of the files and records at the OSA revealed that there are no previously recorded archaeological sites within the project area, although five previously recorded sites are located within a 1-mile radius (Table 1). All of these—31BN116–31BN120—are prehistoric archaeological sites identified by Harold T. Johnson in the 1941–1942 Works Progress Administration (WPA)—University of North Carolina Statewide Survey (Padgett 1991:2). The site forms on file at the OSA are incomplete, with each recording that the sites contained prehistoric lithic and ceramic artifacts with no descriptions or evaluations of the sites. One of the sites, 31BN116, was further investigated during a 1991 NCDOT archaeological study for the widening of NC 151 in Buncombe County (Padgett 1991). This site is a small prehistoric site that produced numerous prehistoric artifacts (primarily lithic debris) and included two Archaic projectile points and Woodland ceramic sherds. Although no subsurface investigations were conducted, the site was recommended for further investigation.

Table 1. Previously recorded archaeological sites within one mile of the project area.

Site No.	Description	NRHP Eligibility	Reference
31BN116	prehistoric village site	Further work recommended	Padgett 1991
31BN117	prehistoric lithic and ceramic scatter	Unassessed	OSA site files
31BN118	prehistoric lithic and ceramic scatter	Unassessed	OSA site files
31BN119	prehistoric lithic and ceramic scatter	Unassessed	OSA site files
31BN120	prehistoric lithic and ceramic scatter	Unassessed	OSA site files

Historic Structures. The historic structure files at the SHPO's Survey and Planning Branch office list two historic structures that lie within a 1-mile radius of the proposed project area (Table 2), both of which were identified during the 1978/1979 architectural survey of Buncombe County (Swaim 1981).

Table 2. Previously recorded historic structures within one mile of the project area.

Site No.	Name	Date	NRHP Eligibility
BN287	Byrd House	1897	Ineligible
BN357	Davis Houses (Pisgah View Ranch)	ca. 1790 and ca. 1900	Ineligible

Site BN287, the Byrd House, is located on the north side of Warren Creek Road (SR 1110), approximately 0.75 mi (1.2 km) north of the project area. At the time of the 1978/1979 architectural survey, the property consisted of a one-story cruciform plan house with staggered shingles and sawn purlin and rafter ends visible in the eave (Swaim 1981:136). Records at the SHPO's Survey and Planning Branch list this property as ineligible for the National Register of Historic Places (NRHP).

Site BN357 is known as the Davis Houses, located on the property of the Pisgah View Ranch approximately 1.1 mi (1.75 km) southwest of the project area. According to Swaim (1981:136), the buildings consist of a heavily reconstructed ca. 1790 log house and a ca. 1900 two-story frame farmhouse. The log house appears to have been moved and possibly rebuilt at its current location on a stone foundation "such that the character of age has been lost" (Swaim 1981:136). The buildings are part of the Pisgah View Ranch, a guest ranch resort in operation by the Cogburn family since 1941 (Pisgah View Ranch 2009). At the time of the architectural survey, Swaim (1981:136) reported that the log house was used as a gift shop while the ca. 1900 farmhouse was the "Ranch" office, dining hall and some guest quarters. Records at the SHPO's Survey and Planning Branch list this property as ineligible for the NRHP.

Cemeteries. The North Carolina Cemetery Survey records at the North Carolina State Archives do not list any recorded cemeteries within the project area. Historic and modern maps also do not show any cemeteries within the project area nor its vicinity.

Historic Map Review. A series of historic maps dating from the 19th century into the 20th century were consulted to determine potential historic structure locations on or adjacent to the project area. Most of the 19th century maps do not show any detail of the project area, although Hominy (also called "Harmony" on early maps) Creek along with its southern fork was plotted at least as early as 1808 (Kerr 1882; MacRae 1833; Price and Strother 1808; Shaffer 1886; Williams 1854). The 1896 Post Route map of North Carolina shows the road leading to Dunsmore, a small community originally located at the intersection of Davis Creek Road (SR 1103) and the modern Pisgah Highway (NC 151) just to the northeast of the project area (Wilson 1896). The earliest maps showing any detail of the project area are the 1892 and 1905 Pisgah USGS topographic maps (Figures 2 and 3) (USGS 1892, 1905). The 1892 map shows the location of Davis Creek Road (SR 1103) and the road that would later become the Pisgah Highway (NC 151), but does not depict any structures (Figure 2). The 1905 map shows a more elaborate but similar road configuration to the 1892 map but also shows structures along Davis Creek Road (no structures appear to be within the current project area) (Figure 3).

The 1920 soil map of Buncombe County shows some detail and depicts buildings in the general vicinity of the project area (Figure 4) (Perkins et al. 1923). However, no structures appear to be within the current project area. The 1938 North Carolina State Highway and Public Works Commission (NCSHPWC) map of Buncombe County shows major roads and buildings in the project vicinity (NCSHPWC 1938) (Figure 5), but is schematic in nature and does not provide a precise depiction of roads or buildings. One building appears to be illustrated within the project vicinity, and may represent one of the buildings that had been located on the south side of South Hominy Creek (Figure 1).

Field Reconnaissance

TRC conducted a limited field reconnaissance of the project area on October 5, 2009. The area is located on the northwest side of Davis Creek Road (SR 1103), 0.3 mi (0.5 km) south of its intersection with the Pisgah Highway (NC 151). TRC staff walked the entire project area searching for any evidence of past cultural activity, examining soil and drainage characteristics, searching soils for artifacts in eroded areas along the creek and tributaries, and searching for potential gravesites or former structure locations.

As previously mentioned, most of the project area is composed of the creek, side banks, and vegetation lining the creeks and tributaries. In some areas portions of agricultural fields lie adjacent to the creeks and likely fall within the non-encroachment area. Visual inspection noted that some areas along the Upper South Hominy Creek are on floodplains approximately 2–6 ft above the creek in some places (Figure 6). Tributary 2 also lies within these floodplain soils, while tributaries 1 and 3 showed primarily hydric soils (Figure 7). Tributary 4, in the northern portion of the project area, showed heavy erosion and steeper slopes than the other areas (Figure 8). No artifacts were observed during the field visit.

During the field visit, TRC staff noted a number of abandoned buildings, particularly those found near Tributary 4 in the northern portion of the project area, including a house and two farm outbuildings/chicken coops (Figures 9 and 10). These structures are of recent construction with a high degree of deterioration, and are considered in-eligible for the NRHP.

CONCLUSIONS

The literature search has identified no previously recorded archaeological sites, historic structures, or cemeteries within the project area. Although five previously identified archaeological sites are situated within a mile of the project area, none will be impacted by the project.

Based on archaeological investigations throughout the region, moderately to well-drained floodplain soils such as are present in portions of the project area are considered to have moderate to high probability for archaeological site location. For example, four of the five archaeological sites previously mentioned

(31BN116–31BN120) were found in similar topographic situations adjacent to portions of Upper South Hominy Creek, including two sites upstream (31BN118–31BN119), and two sites downstream (31BN116–31BN117). For these reasons, shovel testing is recommended in those portions of the project areas that exhibit slopes of less than 15% and do not contain hydric soils, particularly along the main channel of Upper South Hominy Creek, Tributary 2, and in the potential Tributary 2 reroute area. The shovel testing program recommended should include at least one transect of shovel tests at 20-m intervals on each side of Upper South Hominy Creek and Tributary. The Tributary 2 reroute area should be shovel tested at 20-m intervals within the entire area of potential impact. In contrast, hydric soils such as those surrounding tributaries 1 and 3 are considered to have low potential for archaeological sites, as do eroded and sloped soils such as those present along Tributary 4. For that reason, no further work is recommended in the areas along Tributaries 1, 3, and 4.

Please do not hesitate to contact me at (919) 530-8446, or via email at holson@trcsolutions.com, if you would like additional information, or have any questions or comments about this report.

Sincerely,

Heather L. Olson, M.A., RPA
Archaeologist

REFERENCES

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1882 *Map of North Carolina.* On file, North Carolina State Archives, Raleigh.

Mac Rae, John
1833 A New Map of the State of North Carolina. John Mac Rae, Fayetteville, and H.S. Tanner, Philadelphia.

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1938 *Map of Buncombe County, North Carolina.* North Carolina State Highway and Public Works Commission, Raleigh.

Padgett, Thomas J.
1991 Archaeological study, NC 151 from SR 1103 to SR 1129, Buncombe County, TIP No. R-2116. North Carolina Department of Transportation, Raleigh. On file, North Carolina Office of State Archaeology, Raleigh.

Perkins, S.O., R.E. Devereux, S.F. Davidson, and W.A. Davis
1923 *Soil survey of Buncombe County, North Carolina.* U.S. Department of Agriculture, Government Printing Office, Washington, D.C.

Pisgah View Ranch
2009 Home page. Electronic document, http://www.pisgahviewranch.net/, accessed 19 October 2009.

Price, Jon and John Strother
1808 The First Actual Survey of the State of North Carolina. Plate IX in *North Carolina in Maps*, edited by W. P. Cumming, 1966. State Department of Archives and History, Raleigh.

Shaffer, A.W.
1886 Shaffer's Township Map of North Carolina. On file, North Carolina State Archives, Raleigh.

Swaim, Douglas, editor
1981 *Cabins and Castles: The History and Architecture of Buncombe County, North Carolina.* City of Asheville and County of Buncombe, North Carolina.

United States Geological Survey (USGS)
1892 *Pisgah, North Carolina.* 1:62,500 scale.
1905 *Pisgah, North Carolina.* 1:62,500 scale.
1941 *Cruso, North Carolina.* 1:24,000 scale.
1967 *Dunsmore Mountain, North Carolina.* 1:24,500 scale.

Williams, W.
1854 *A New Map of the State of North Carolina.* On file, North Carolina State Archives, Raleigh.

Wilson, William L.
1896 *Post Route Map of the States of North Carolina and South Carolina.* Plate XV in *North Carolina in Maps*, edited by W. P. Cumming, 1966. State Department of Archives and History, Raleigh.

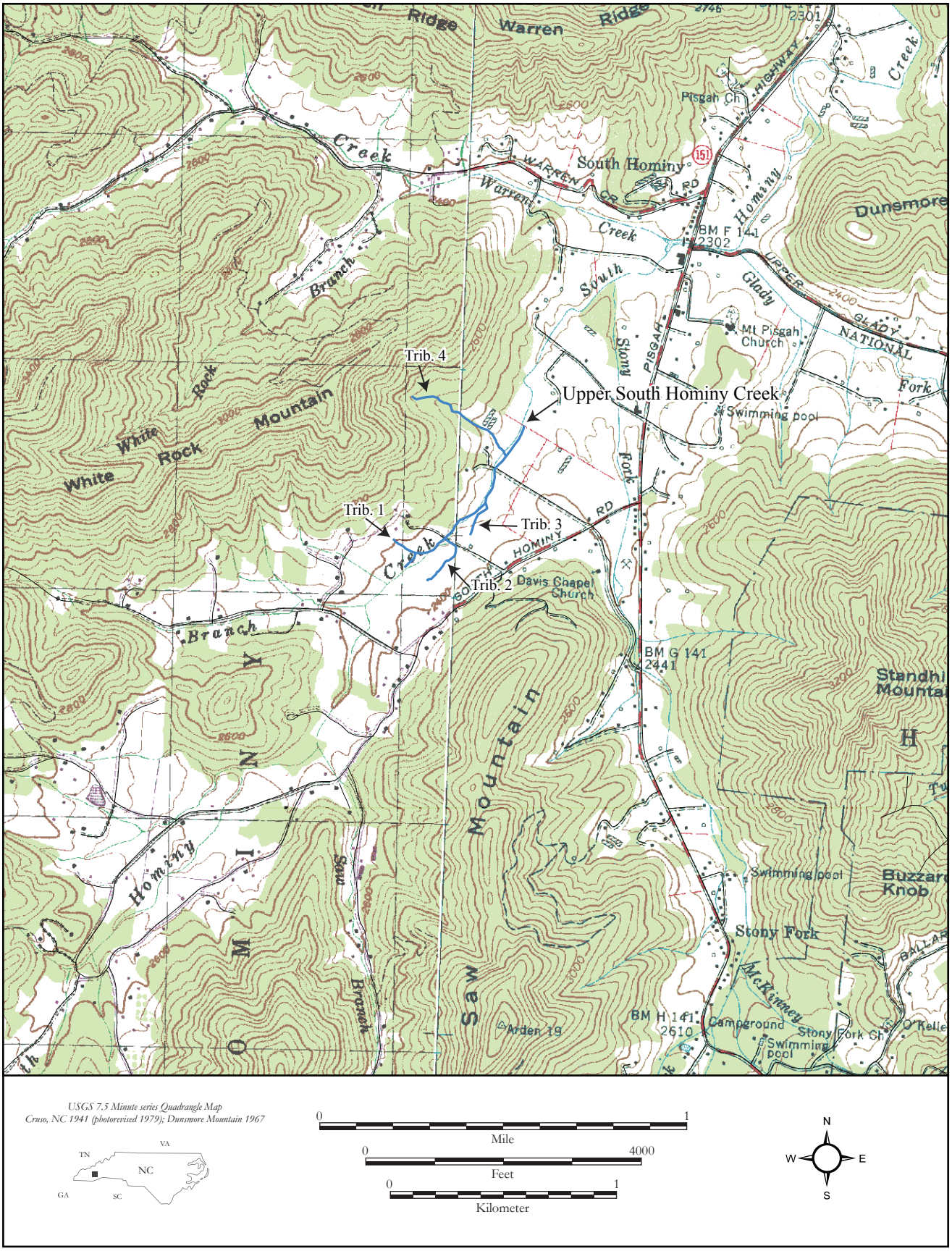


Figure 1. Location map for the Upper South Hominy Creek project.

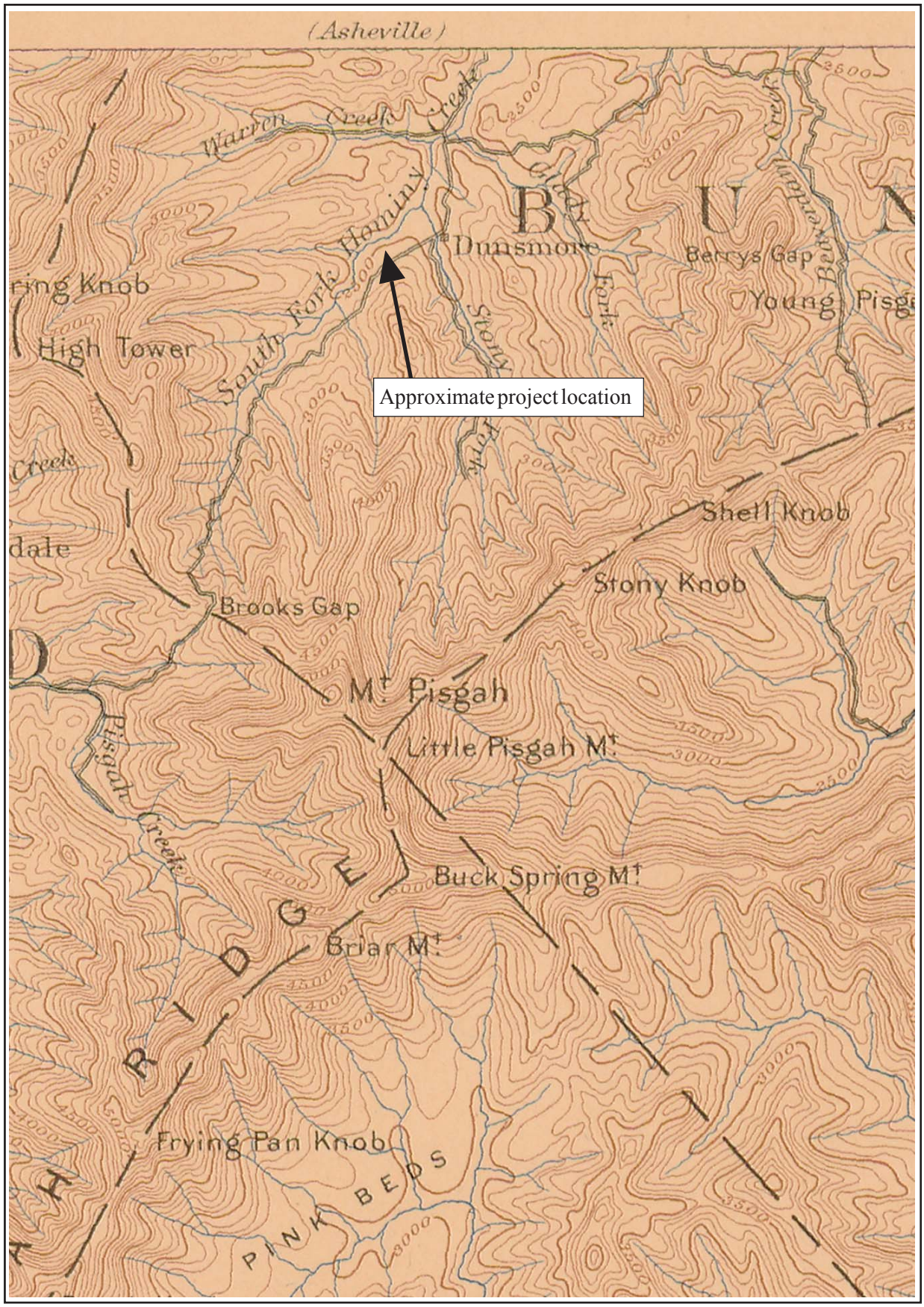


Figure 2. The Upper South Hominy Creek project area as depicted in 1892.

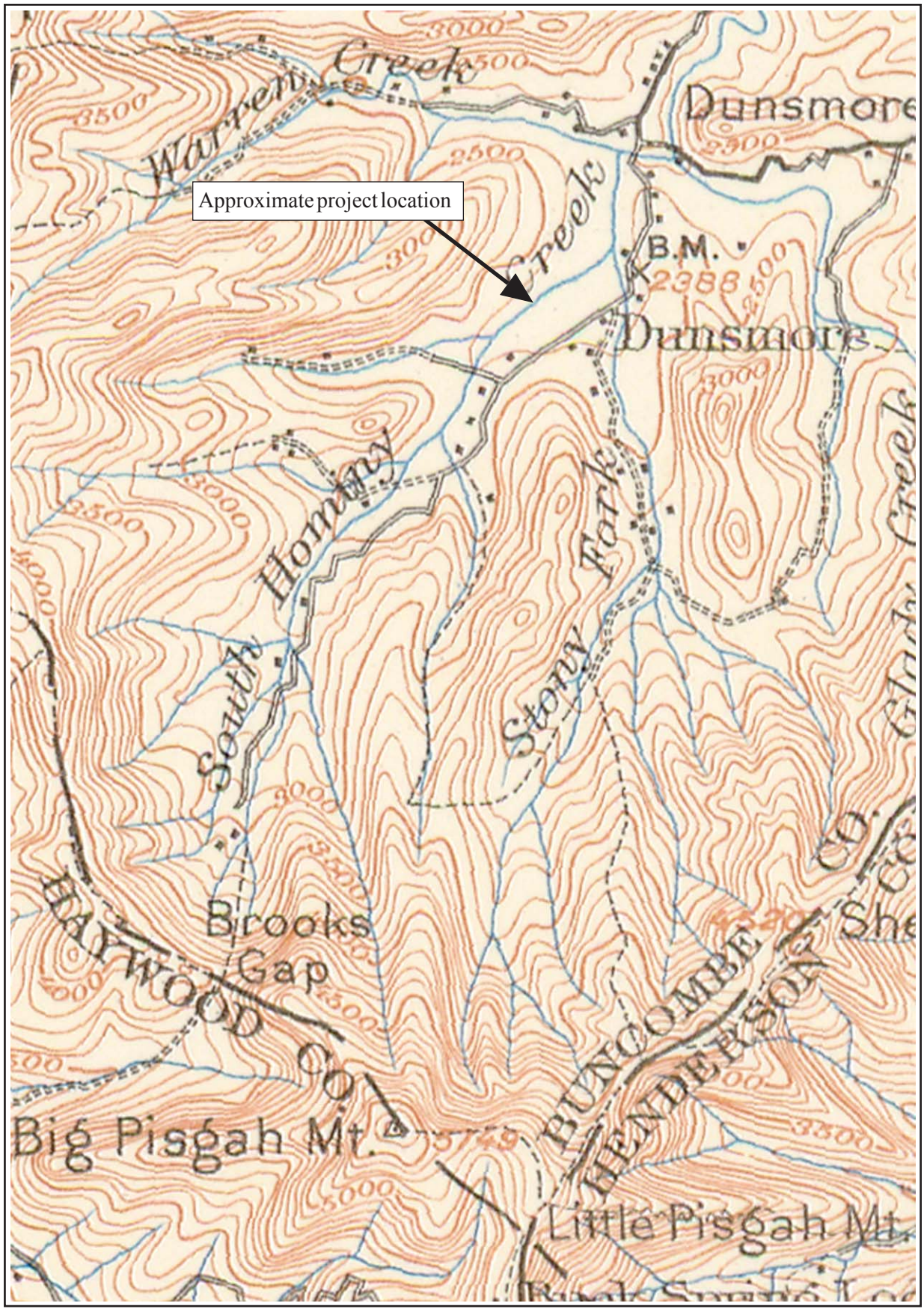


Figure 3. The Upper South Hominy Creek project area as depicted in 1905.

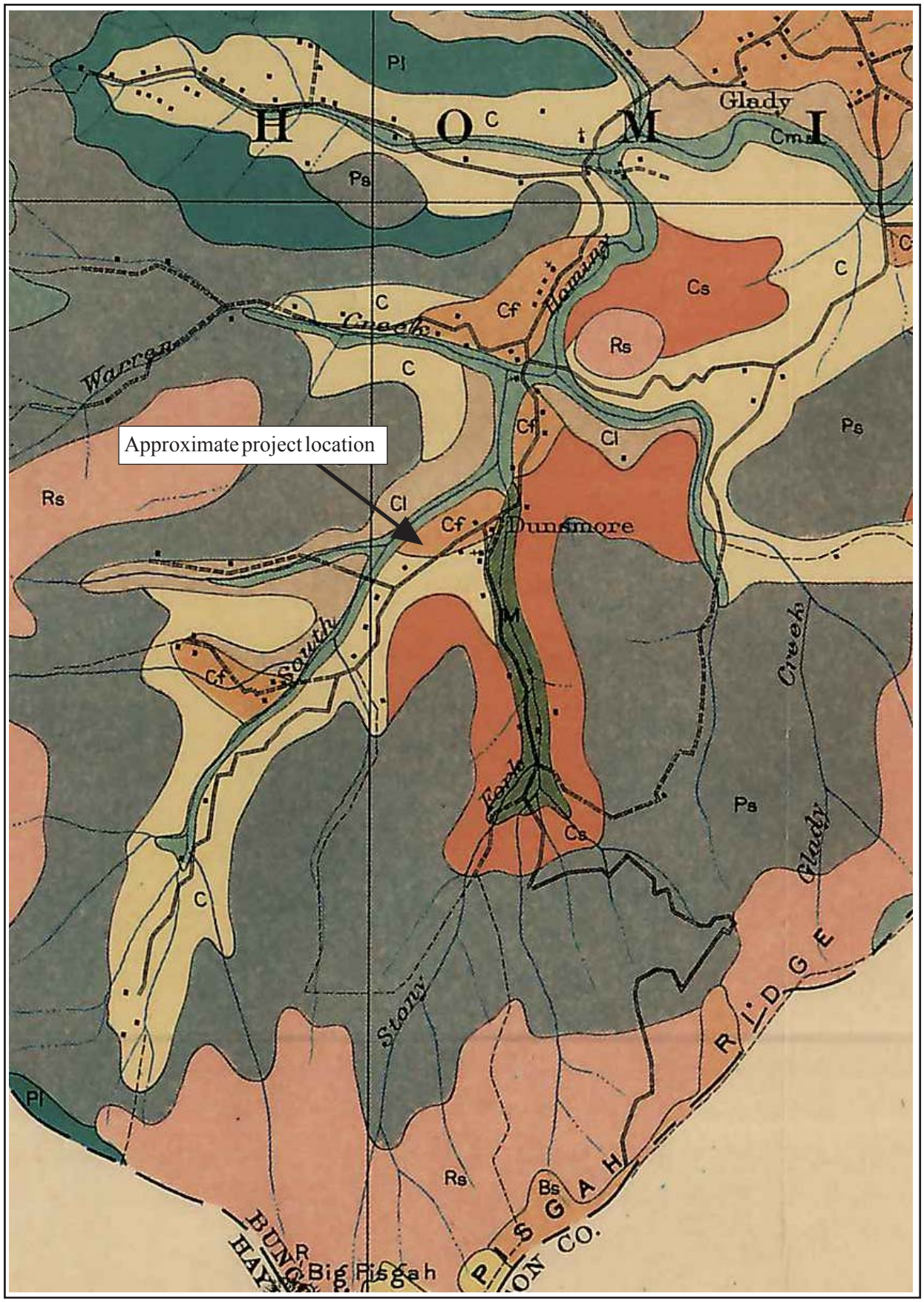


Figure 4. The Upper South Hominy Creek project area as depicted in 1920.

Figure 5. The Upper South Hominy Creek project area as depicted in 1938.

Figure 6. East bank of Upper South Hominy Creek, view to northeast.

Figure 7. Standing water in hydric soil area of Tributary 1, view to south.

Figure 8. Tributary 4 showing steep side slopes and eroded soils, view to northwest.

Figure 9. View of abandoned house near Upper South Hominy Creek project area, view to northwest.

Figure 10. View of abandoned farm building/chicken house near Upper South Hominy Creek project area, view to northwest.

Figure C.2 State Historic Preservation Office Correspondence and Documentation.

North Carolina Department of Cultural Resources
State Historic Preservation Office
Peter B. Sandbeck, Administrator

Beverly Eaves Perdue, Governor
Linda A. Carlisle, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

December 10, 2009

Andrew Bick
Confluence Engineering, PC
16 Broad Street
Asheville, NC 28801

Re: Upper South Hominy Creek Mitigation, Buncombe County, ER 09-2790

Dear Mr. Bick:

Thank you for your letter of November 13, 2009, concerning the above project.

There are no known recorded archaeological sites within the project boundaries. However, the project area has never been systematically surveyed to determine the location or significance of archaeological resources. Based on the topographic and hydrological situation, there is a high probability for the presence of prehistoric or historic archaeological sites within portions of the project area.

We recommend that a comprehensive survey be conducted by an experienced archaeologist to identify and evaluate the significance of archaeological remains that may be damaged or destroyed by the proposed project. Potential effects on unknown resources must be assessed prior to the initiation of construction activities.

Two copies of the resulting archaeological survey report, as well as one copy of the appropriate site forms, should be forwarded to us for review and comment as soon as they are available and well in advance of any construction activities.

A list of archaeological consultants who have conducted or expressed an interest in contract work in North Carolina is available at www.arch.dcr.state.nc.us/consults.htm. The archaeologists listed, or any other experienced archaeologist, may be contacted to conduct the recommended survey.

We have determined that the project as proposed will not have an effect on any historic structures.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Location: 109 East Jones Street, Raleigh NC 27601 **Mailing Address**: 4617 Mail Service Center, Raleigh NC 27699-4617 **Telephone/Fax**: (919) 807-6570/807-6599

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/807-6579. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

Peter Sandbeck

Figure C.3 Tribal Historic Preservation Office Correspondence and Documentation

Confluence Engineering, PC
16 Broad Street
Asheville, NC 28801
828.255.5530

January 19, 2010

Mr. Russell Townsend, THPO
Eastern Band of Cherokee Indians
Qualla Boundary Reservation
PO Box 455
Cherokee, NC 28719

Re: Upper South Hominy Creek Mitigation Project, Buncombe County, North Carolina

Dear Mr. Townsend:

On behalf of the North Carolina Ecosystem Enhancement Program (EEP), we are requesting review and comment on any potential cultural resource issues relating to the proposed Upper South Hominy Creek stream mitigation project. The site is located south of the community of South Hominy in Buncombe County. Attached Figures 1 and 2 show the project vicinity and approximate areas of impact.

This project will involve a range of mitigation approaches, including Restoration, Enhancement Levels I and II, and preservation. The areas of potential impact are shown on those reaches of where new stream channel excavation is proposed (Restoration) and on Enhancement Level I reaches where floodplain benches and bank grading are proposed. These potential impacts areas include four reaches of the South Hominy Creek main stem, and the downstream ends of Tributaries 1, 2 and 4. The remainder of the project involves Enhancement Level II (minor bank grading within the existing channels and buffer planting) and Preservation.

Initial observations did not reveal any historic structures or archeological artifacts. We also note that the areas of potential impact have a long history of agricultural use, including tilling.

We would appreciate your review of this information and a determination regarding any potential impacts to cultural resources associated with this project.

Please don't hesitate to contact me at (828) 255-5530 or via email at andrew@confluence-eng.com should you have any questions or concerns regarding this project.

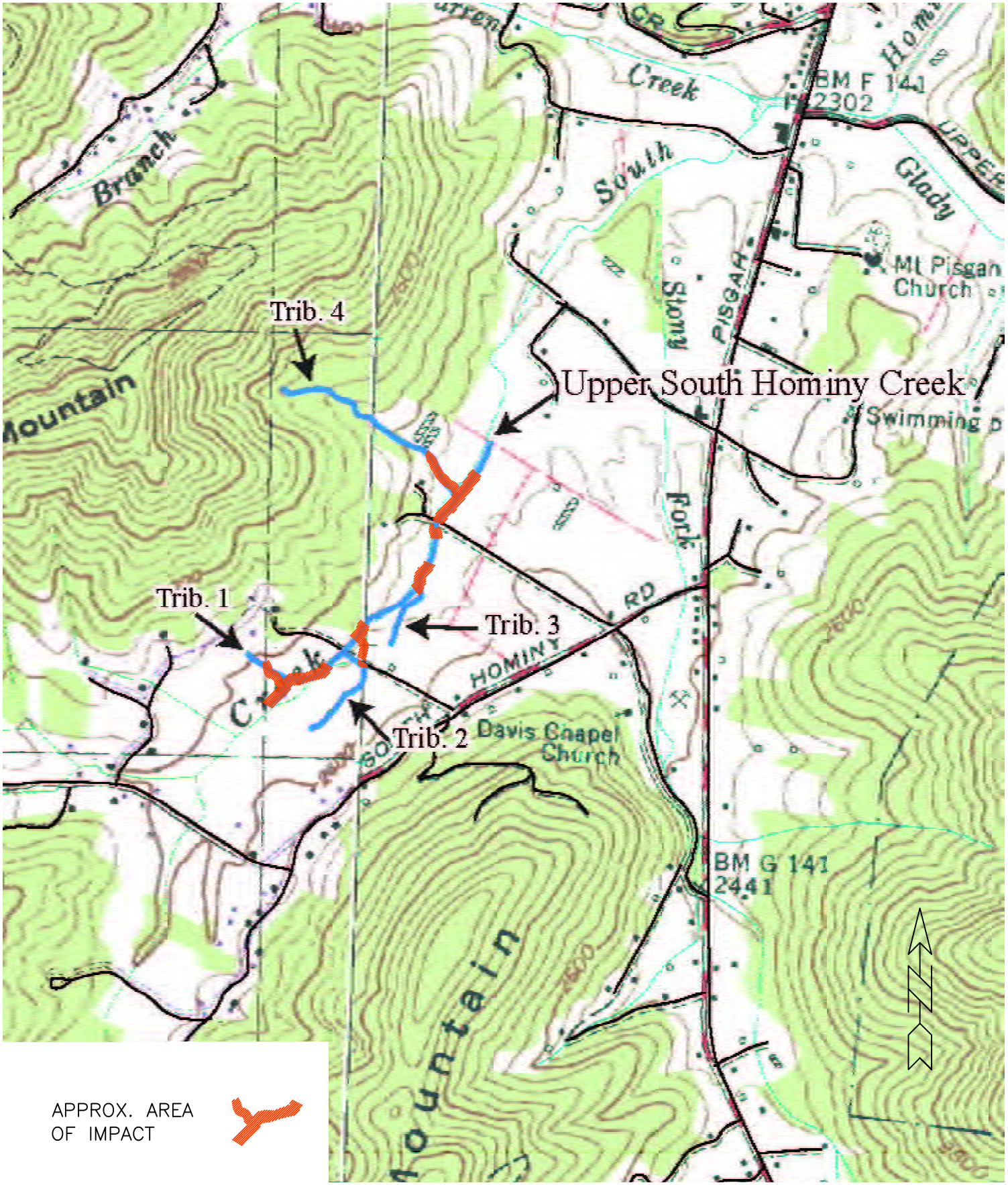
Sincerely,

Confluence Engineering, PC

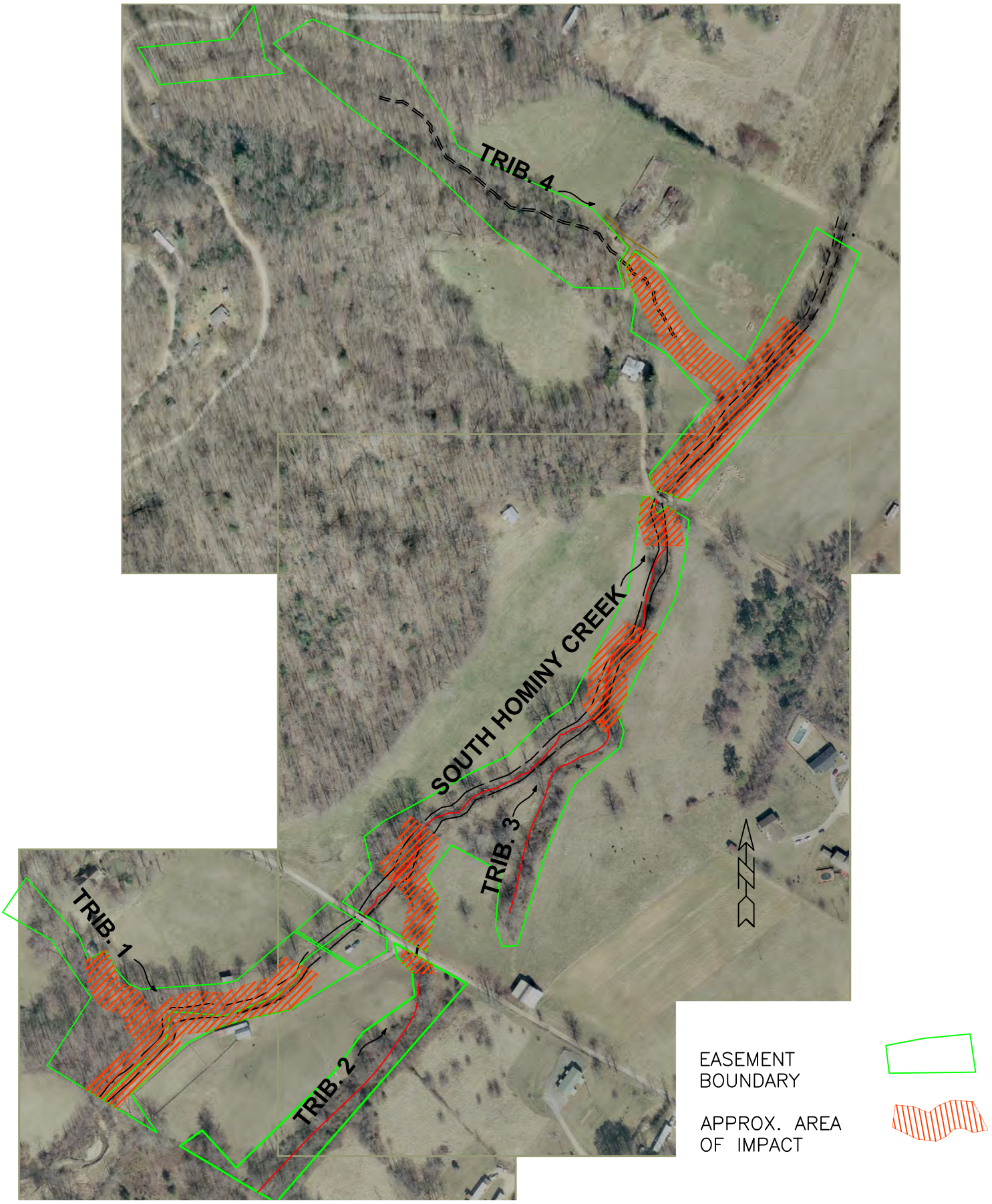
Andrew Bick, PE
Principal

Attachments

cc: Harry Tsomides, EEP



PROJECT VICINITY MAP SCALE: 1" = 2,000' DATE: 11/13/09	UPPER SOUTH HOMINY CREEK STREAM MITIGATION PROJECT BUNCOMBE COUNTY, NC	**CONFLUENCE** ENGINEERING, PC 16 Broad Street Asheville, North Carolina 28801 Phone: 828.255.5530 confluence-eng.com	FIGURE 1



AERIAL PHOTOGRAPHY SCALE: 1" = 300' DATE: 11/13/09	UPPER SOUTH HOMINY CREEK STREAM MITIGATION PROJECT BUNCOMBE COUNTY, NC	**CONFLUENCE** ENGINEERING, PC 16 Broad Street Asheville, North Carolina 28801 Phone: 828.255.5530 confluence-eng.com	FIGURE 2

Figure C4. Categorical Exclusion Form

Categorical Exclusion Form for Ecosystem Enhancement Program Projects
Version 1.4

Note: Only Appendix A should to be submitted (along with any supporting documentation) as the environmental document.

Part 1: General Project Information	
Project Name:	Upper South Hominy Creek Mitigation Project
County Name:	Buncombe
EEP Number:	92632
Project Sponsor:	Ecosystem Enhancement Progam
Project Contact Name:	Harry Tsomides
Project Contact Address:	5 Ravenscroft Drive Asheville, NC 28801
Project Contact E-mail:	harry.tsomides@ncdenr.gov
EEP Project Manager:	Harry Tsomides

Project Description

The project involves the restoration, enhancement and perservation of the main stem of South Hominy Creek and three unnamed tributaries.

For Official Use Only

Reviewed By:

Date — **EEP Project Manager**

Conditional Approved By:

Date — **For Division Administrator FHWA**

☐ **Check this box if there are outstanding issues**

Final Approval By:

1-14-11

Date — **For Division Administrator FHWA**

Part 2: All Projects Regulation/Question	Response
Coastal Zone Management Act (CZMA)	
1. Is the project located in a CAMA county?	☐ Yes ☑ No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	☐ Yes ☐ No ☑ N/A
3. Has a CAMA permit been secured?	☐ Yes ☐ No ☑ N/A
4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program?	☐ Yes ☐ No ☑ N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	
1. Is this a "full-delivery" project?	☐ Yes ☑ No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	☐ Yes ☑ No ☐ N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☐ No ☑ N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☐ No ☑ N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	☐ Yes ☐ No ☑ N/A
6. Is there an approved hazardous mitigation plan?	☐ Yes ☐ No ☑ N/A
National Historic Preservation Act (Section 106)	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	☐ Yes ☑ No
2. Does the project affect such properties and does the SHPO/THPO concur?	☐ Yes ☐ No ☑ N/A
3. If the effects are adverse, have they been resolved?	☐ Yes ☐ No ☑ N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)	
1. Is this a "full-delivery" project?	☐ Yes ☑ No
2. Does the project require the acquisition of real estate?	☐ Yes ☐ No ☑ N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	☐ Yes ☐ No ☑ N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	☐ Yes ☐ No ☑ N/A

Part 3: Ground-Disturbing Activities Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	☑ Yes ☐ No
2. Is the site of religious importance to American Indians? THPO was invited to comment on the project and no response was received. All correspondence is located in Attachment E.	☐ Yes ☑ No ☐ N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	☐ Yes ☐ No ☑ N/A
4. Have the effects of the project on this site been considered?	☐ Yes ☐ No ☑ N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	☐ Yes ☑ No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	☐ Yes ☑ No
2. Will there be a loss or destruction of archaeological resources?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	☑ Yes ☐ No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	☐ Yes ☑ No ☐ N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	☐ Yes ☐ No ☑ N/A
4. Is the project "likely to adversely affect" the species and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☐ No ☑ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	☐ Yes ☐ No ☑ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☐ No ☑ N/A

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	☐ Yes ☑ No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	☐ Yes ☐ No ☑ N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	☐ Yes ☐ No ☑ N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	☑ Yes ☐ No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	☑ Yes ☐ No ☐ N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	☑ Yes ☐ No ☐ N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	☑ Yes ☐ No
2. Have the USFWS and the NCWRC been consulted?	☑ Yes ☐ No ☐ N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	☐ Yes ☑ No
2. Has the NPS approved of the conversion?	☐ Yes ☐ No ☑ N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	☐ Yes ☑ No
2. Is suitable habitat present for EFH-protected species?	☐ Yes ☐ No ☑ N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	☐ Yes ☐ No ☑ N/A
4. Will the project adversely affect EFH?	☐ Yes ☐ No ☑ N/A
5. Has consultation with NOAA-Fisheries occurred?	☐ Yes ☐ No ☑ N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	☐ Yes ☑ No
2. Have the USFWS recommendations been incorporated?	☐ Yes ☐ No ☑ N/A
Wilderness Act	
1. Is the project in a Wilderness area?	☐ Yes ☑ No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	☐ Yes ☐ No ☑ N/A

Figure C.5 Environmental Data Resources, Inc. Correspondence and Report.

South Hominy Creek
off Davis Creek Road
Buncombe County, NC 28715

Inquiry Number: 2616769.1s
October 19, 2009

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

OFF DAVIS CREEK ROAD
BUNCOMBE COUNTY, NC 28715

COORDINATES

Latitude (North):	35.478100 - 35° 28' 41.2''
Longitude (West):	82.750600 - 82° 45' 2.2''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	341177.7
UTM Y (Meters):	3927274.0
Elevation:	2369 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	35082-D7 CRUSO, NC
Most Recent Revision:	2001
East Map:	35082-D6 DUNSMORE MOUNTAIN, NC
Most Recent Revision:	2001

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

EXECUTIVE SUMMARY

Federal CERCLIS list

CERCLIS ..... Comprehensive Environmental Response, Compensation, and Liability Information System

Federal CERCLIS NFRAP site List

CERC-NFRAP ..... CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Transporters, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ..... RCRA - Large Quantity Generators
RCRA-SQG ..... RCRA - Small Quantity Generators
RCRA-CESQG ..... RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls

Federal ERNS list

ERNS ..... Emergency Response Notification System

State- and tribal - equivalent NPL

NC HSDS ..... Hazardous Substance Disposal Site

State- and tribal - equivalent CERCLIS

SHWS ..... Inactive Hazardous Sites Inventory

State and tribal landfill and/or solid waste disposal site lists

OLI ..... Old Landfill Inventory

State and tribal leaking storage tank lists

LUST ..... Regional UST Database
LUST TRUST ..... State Trust Fund Database
INDIAN LUST ..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

UST ..... Petroleum Underground Storage Tank Database
AST ..... AST Database
INDIAN UST ..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL ..... No Further Action Sites With Land Use Restrictions Monitoring

State and tribal voluntary cleanup sites

VCP ..... Responsible Party Voluntary Action Sites
INDIAN VCP ..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ..... Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

ODI ..... Open Dump Inventory
DEBRIS REGION 9 ..... Torres Martinez Reservation Illegal Dump Site Locations
HIST LF ..... Solid Waste Facility Listing
INDIAN ODI ..... Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ..... Clandestine Drug Labs
US HIST CDL ..... National Clandestine Laboratory Register

Local Land Records

LIENS 2 ..... CERCLA Lien Information
LUCIS ..... Land Use Control Information System

Records of Emergency Release Reports

HMIRS ..... Hazardous Materials Information Reporting System

Other Ascertainable Records

RCRA-NonGen ..... RCRA - Non Generators
DOT OPS ..... Incident and Accident Data
DOD ..... Department of Defense Sites
FUDS ..... Formerly Used Defense Sites
CONSENT ..... Superfund (CERCLA) Consent Decrees
ROD ..... Records Of Decision
UMTRA ..... Uranium Mill Tailings Sites
MINES ..... Mines Master Index File
TRIS ..... Toxic Chemical Release Inventory System
TSCA ..... Toxic Substances Control Act
FTTS ..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

HIST FTTS FIFRA/TSCA Tracking System Administrative Case Listing
SSTS Section 7 Tracking Systems
ICIS Integrated Compliance Information System
PADS PCB Activity Database System
MLTS Material Licensing Tracking System
RADINFO Radiation Information Database
FINDS Facility Index System/Facility Registry System
RAATS RCRA Administrative Action Tracking System
IMD Incident Management Database
UIC Underground Injection Wells Listing
DRYCLEANERS Drycleaning Sites
NPDES NPDES Facility Location Listing
INDIAN RESERV Indian Reservations
SCRD DRYCLEANERS State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER PCB Transformer Registration Database
COAL ASH Coal Ash Disposal Sites

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Department of Environment & Natural Resources' List of Solid Waste Facility Contacts in Alpha Order.

A review of the SWF/LF list, as provided by EDR, and dated 07/21/2009 has revealed that there is 1 SWF/LF site within approximately 0.5 miles of the target property.

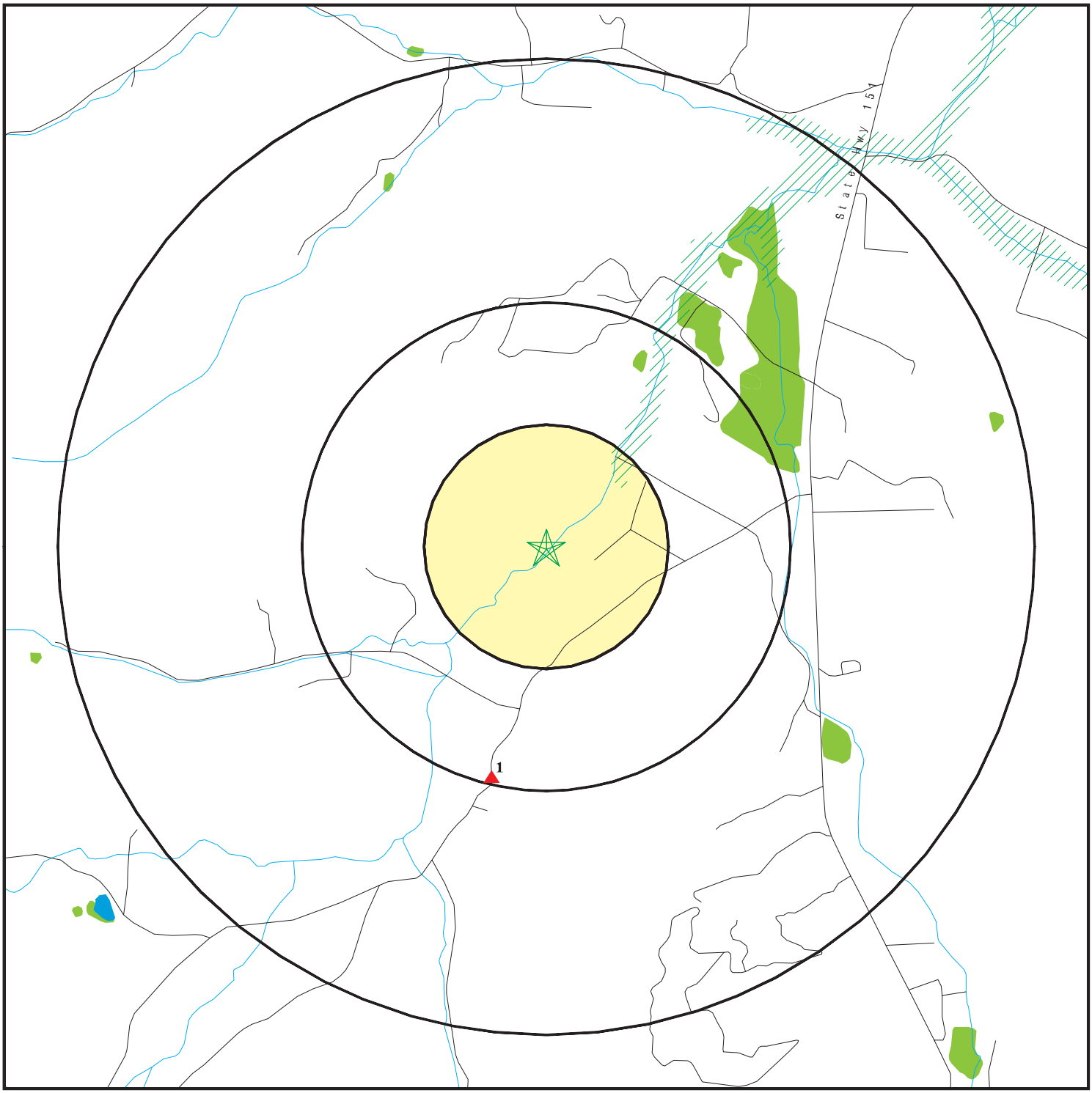
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
A ARROW SEPTIC TANK SERVICE	311 DAVIS CREEK ROAD	SSW 1/4 - 1/2 (0.484 mi.)	1	7

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
PISGAH VALLEY MARKET	LUST, UST, IMD
FORMER JESSE ISRAEL JR PROPERT	LUST, IMD
COUNTRY FOODS STORE 6	UST
SAVINGS STATION	UST
MC ELRATH CONST. CO.INC.	UST
RIDGEWAY BAPTIST CHURCH	UST
DAYS INN (WEST)	UST
GREEN GROCERY	UST
MORGAN GROCERY	UST
DIVERSIFIED LABORATORIES INC.	FINDS, RCRA-NonGen
SILVER CREEK APARTMENTS	FINDS
CATHY BUCKNER RESIDENCE	IMD

OVERVIEW MAP - 2616769.1s



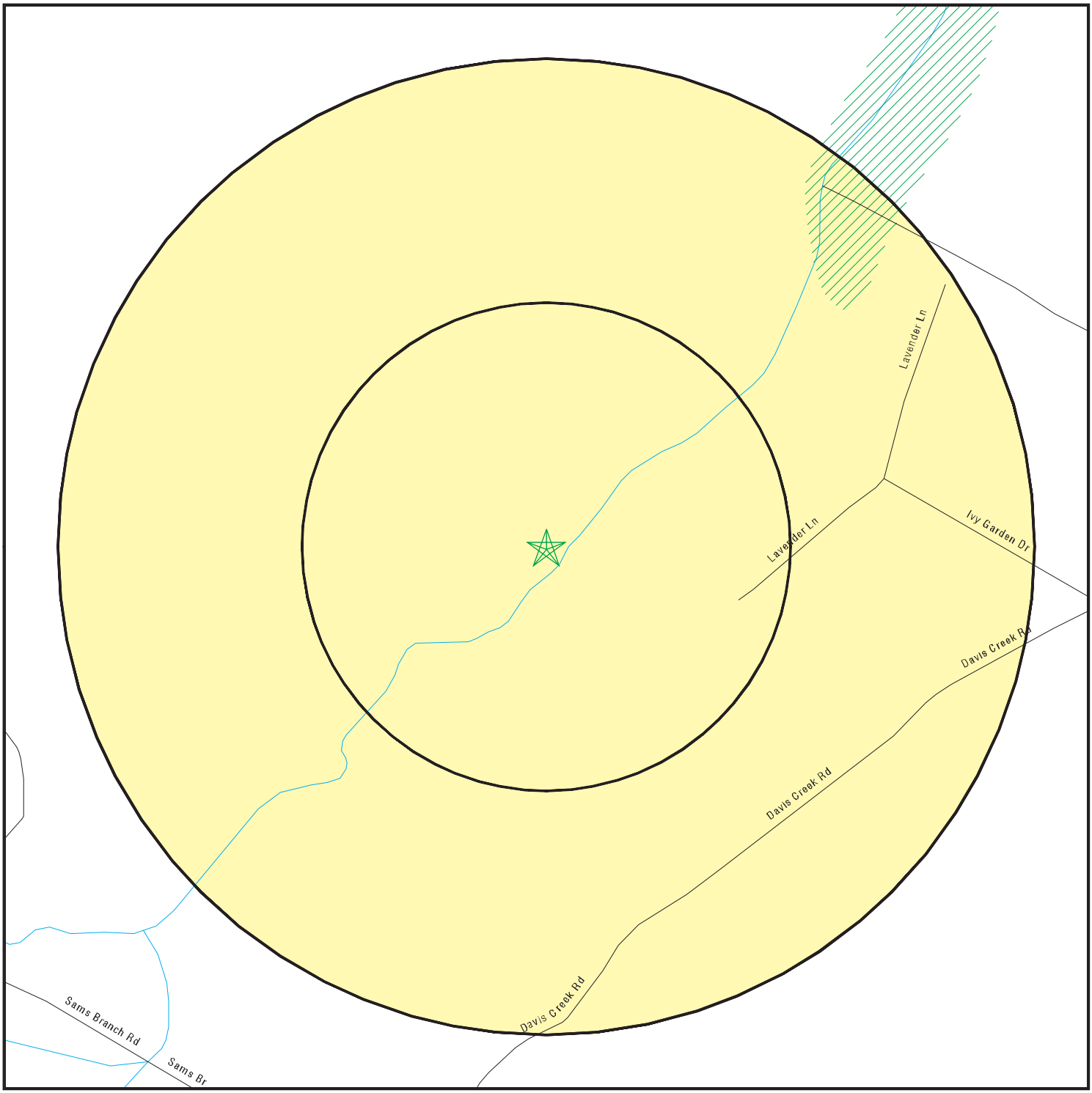
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

0 1/4 1/2 1 Miles

N

SITE NAME:	South Hominy Creek	CLIENT:	Confluence Engineering, PC
ADDRESS:	off Davis Creek Road Buncombe County NC 28715	CONTACT:	Andrew Bick
		INQUIRY #:	2616769.1s
LAT/LONG:	35.4781 / 82.7506	DATE:	October 19, 2009 1:01 pm

DETAIL MAP - 2616769.1s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Hazardous Substance Disposal Sites

0 1/16 1/8 1/4 Miles

SITE NAME:	South Hominy Creek	CLIENT:	Confluence Engineering, PC
ADDRESS:	off Davis Creek Road Buncombe County NC 28715	CONTACT:	Andrew Bick
		INQUIRY #:	2616769.1s
LAT/LONG:	35.4781 / 82.7506	DATE:	October 19, 2009 1:01 pm

Figure C.6 The USH Mitigation Site Flood Study Report, No-Rise Certification, and Floodplain Development Permit Application.

FLOOD STUDY REPORT

UPPER SOUTH HOMINY CREEK MITIGATION PROJECT

BUNCOMBE COUNTY, NORTH CAROLINA

January 22, 2010

Prepared For:
NC Ecosystem Enhancement Program

Prepared By:
Confluence Engineering, PC

Table of Contents

Backgroun

The NC Ecosystem Enhancement Program (EEP) is sponsoring a stream mitigation project on South Hominy Creek and four tributaries in the southwestern portion of Buncombe County. The main stem of South Hominy Creek is located within a special flood hazard area as indicated on the Flood Insurance Rate Maps (FIRMs) dated January 6, 2010.

Objective

The objective of this study is to evaluate the potential flooding effects of proposed stream restoration and enhancement measures, including bank sloping, excavation of floodplain benches and placement of in-stream stone and wood structures. Work is proposed to take place between FEMA cross sections 465 and 500; the study reach extends downstream and upstream of the work reach, from FEMA cross section 447 to cross section 529.

Site Description

Land use in the Upper South Hominy Creek watershed is mainly agricultural and low density residential, with some forested areas. The project site is bounded by pastures and fields. Photos of the site are included below.

Bank Erosion on South Hominy Creek

Right Floodplain, Looking Downstream

According to the Buncombe County FIS, the 100-year discharges for the study reach range from 2,120 to 2,580 cubic feet per second (cfs). The current flood hazard area information for the site is included on the FIRM panels 8684 and 8685, dated January 6, 2010. Annotated versions of these FIRM panels are included in Appendix A. Table 1 lists the community jurisdiction associated with the FIRM panels.

Table 1: Community and FIRM Panel

Community Jurisdiction	Community Number	Panel Numbers
Buncombe County	370031	8684, 8685

Methodology

We obtained a copy of the effective HEC-RAS model and GIS cross section shapefiles from the NC Division of Emergency Management. This model served as the duplicate effective model for our study.

The NC Wildlife Resources Commission (WRC) conducted a detailed survey of the South Hominy Creek main stem, including two bridge crossings. WRC gathered floodplain topographic data beyond the limits of their survey from LIDAR data provided by the NC Department of Transportation. WRC used the two data sets to construct a three dimensional surface model of the project reach; the attached base map shows topography from this surface model. A comparison of the WRC data set with the duplicate effective model indicates that an existing conditions model reflecting the surveyed creek and bridge data is warranted. We used the surface model to extract cross sections for the existing conditions model.

The proposed conditions model is a copy of the existing conditions model with the addition of the proposed bank and bed modifications in the stream restoration and enhancement reaches. Summaries of the three models are included below.

Duplicate Effective Model

We ran the effective model provided to us in HEC-RAS (v. 4.0). As shown in Table 2, there are a few discrepancies in the 100-year water surface elevations (WSEL) and non-encroachment widths between the duplicate effective model and the FIS. All but one of the WSEL differences are 0.1 foot and the largest of the WSEL differences is more than 1,000 feet upstream of the limits of the proposed work. Because we have no data to support a resolution of the differences, we left the duplicate effective model as it was provided to us. Output of the duplicate effective run is included in Appendix B.

Table 2. FIS and Duplicate Effective Comparison

Flood Discharge = 2120 to 2580 cfs		100-year WSEL (ft, NAVD88)			Non-Encroachment Width (ft)		
FEMA Cross Section	Stream Station (feet from mouth)	FIS	Duplicate Effective	Comparison DE-FIS	FIS	Duplicate Effective	Comparison DE-FIS
529	52910	2409.0	2408.96	0.0	231	231	0
525	52484	2402.5	2402.48	0.0	200	200	0
524	52446	2401.6	2401.58	0.0	200	200	0
521	52072	2396.6	2396.62	0.0	264	264	0
514	51423	2385.8	2385.75	-0.1	232	232	0
510	50987	2379.3	2379.91	0.6	75	75	0
509	50921	2378.1	2378.14	0.0	100	100	0
505	50524	2373.8	2373.75	-0.1	57	56	-1
500	50007	2368.3	2368.33	0.0	141	140	-1
494	49373	2360.1	2360.13	0.0	84	84	0
490	48966	2357.2	2357.21	0.0	131	131	0
489	48910	2355.5	2355.49	0.0	131	131	0
486	48578	2351.9	2351.84	-0.1	121	111	-10
481	48073	2347.5	2347.52	0.0	95	95	0
477	47689	2346.3	2346.32	0.0	322	322	0
476	47643	2344.7	2344.65	0.0	189	189	0
473	47309	2340.8	2340.78	0.0	116	115	-1
465	46529	2336.1	2336.11	0.0	290	290	0
462	46190	2335.6	2335.65	0.1	160	160	0
461	46132	2330.2	2330.23	0.0	84	84	0
459	45869	2329.5	2329.48	0.0	269	269	0
456	45630	2329.3	2329.29	0.0	174	174	0
456	45590	2327.4	2327.35	-0.1	174	174	0
456	45585	2327.4	2327.45	0.0	209	209	0
455	45548	2325.6	2325.57	0.0	129	129	0
453	45267	2322.2	2322.16	0.0	167	167	0
447	44660	2315.6	2315.63	0.0	167	167	0

Existing Conditions Model

The existing conditions model reflects the WRC data set between cross sections 465 and 500, including bridge geometry at cross sections 477 and 489. Duplicate effective data for the remaining cross sections is unchanged. The WRC data set shows generally higher creek and floodplain elevations than the duplicate effective model, and the existing conditions model output indicates generally higher WSEL results through the study reach. The existing conditions model also indicates a significantly narrower non-encroachment width at cross section 477. Differences converge to zero within the work reach.

Encroachment surcharges were consistently less than 1 foot with the exception of cross section 490; despite numerous iterations with various encroachment methodologies, we were unable to show a surcharge less than 1.11 foot at this location. We believe complex hydraulics in the vicinity of the bridge may explain this condition.

Table 3 below provides a summary of the HEC-RAS output; complete output is included in Appendix B.

Table 3. FIS, Duplicate Effective, and Existing Conditions Comparison

Flood Discharge = 2120 to 2580 cfs		100-year WSEL (ft, NAVD88)				Non-Encroachment Width (ft)			
FEMA Cross Section	Stream Station (feet from mouth)	FIS	Duplicate Effective	Existing Conditions	Comparison EC-DE	FIS	Duplicate Effective	Existing Conditions	Comparison EC-DE
529	52910	2409.0	2408.96	2408.96	0.00	231	231	231	0
525	52484	2402.5	2402.48	2402.48	0.00	200	200	200	0
524	52446	2401.6	2401.58	2401.58	0.00	200	200	200	0
521	52072	2396.6	2396.62	2396.62	0.00	264	264	264	0
514	51423	2385.8	2385.75	2385.75	0.00	232	232	232	0
510	50987	2379.3	2379.91	2379.91	0.00	75	75	75	0
509	50921	2378.1	2378.14	2378.14	0.00	100	100	100	0
505	50524	2373.8	2373.75	2373.75	0.00	57	56	56	0
500	50007	2368.3	2368.33	2368.33	0.00	141	140	140	0
494	49373	2360.1	2360.13	2361.23	1.10	84	84	84	0
490	48966	2357.2	2357.21	2357.45	0.24	131	131	128	-3
489	48910	2355.5	2355.49	2356.33	0.84	131	131	131	0
486	48578	2351.9	2351.84	2352.60	0.76	121	111	111	0
481	48073	2347.5	2347.52	2348.27	0.75	95	95	95	0
477	47689	2346.3	2346.32	2346.74	0.42	322	322	189	-133
476	47643	2344.7	2344.65	2345.12	0.47	189	189	189	0
473	47309	2340.8	2340.78	2341.51	0.73	116	115	115	0
465	46529	2336.1	2336.11	2336.11	0.00	290	290	290	0
462	46190	2335.6	2335.65	2335.65	0.00	160	160	160	0
461	46132	2330.2	2330.23	2330.23	0.00	84	84	84	0
459	45869	2329.5	2329.48	2329.48	0.00	269	269	269	0
456	45630	2329.3	2329.29	2329.29	0.00	174	174	174	0
456	45590	2327.4	2327.35	2327.35	0.00	174	174	174	0
456	45585	2327.4	2327.45	2327.45	0.00	209	209	209	0
455	45548	2325.6	2325.57	2325.57	0.00	129	129	129	0
453	45267	2322.2	2322.16	2322.16	0.00	167	167	167	0
447	44660	2315.6	2315.63	2315.6	0.00	167	167	167	0

Proposed Conditions Model

The proposed conditions model is a copy of the existing conditions model, with modifications to reflect the proposed bank grading, in-stream structures and stream buffer planting. The attached plans provide specific information about the proposed work.

The proposed conditions model results show no increase in WSEL or non-encroachment widths as compared to the existing conditions model. Slight reductions in WSEL are indicated at cross sections 473, 476 and 481, while non-encroachment widths are unchanged. Encroachment surcharges for the proposed conditions case are less than 1 foot with the exception of cross section 490; as described above, we were unable to achieve a surcharge less than 1.11 foot at this location.

Results are summarized in Table 4 and output of the proposed conditions run is included in Appendix B.

Table 4. Existing and Proposed Conditions Comparison

Flood Discharge = 2120 to 2580 cfs		100-year WSEL (ft, NAVD88)			Non-Encroachment Width (ft)		
FEMA Cross Section	Stream Station (feet from mouth)	Existing Conditions	Proposed Conditions	Comparison PC-EC	Existing Conditions	Proposed Conditions	Comparison PC-EC
529	52910	2408.96	2408.96	0.00	231	231	0
525	52484	2402.48	2402.48	0.00	200	200	0
524	52446	2401.58	2401.58	0.00	200	200	0
521	52072	2396.62	2396.62	0.00	264	264	0
514	51423	2385.75	2385.75	0.00	232	232	0
510	50987	2379.91	2379.91	0.00	75	75	0
509	50921	2378.14	2378.14	0.00	100	100	0
505	50524	2373.75	2373.75	0.00	56	56	0
500	50007	2368.33	2368.33	0.00	140	140	0
494	49373	2361.23	2361.23	0.00	84	84	0
490	48966	2357.45	2357.45	0.00	128	128	0
489	48910	2356.33	2356.33	0.00	131	131	0
486	48578	2352.60	2352.60	0.00	111	111	0
481	48073	2348.27	2348.26	-0.01	95	95	0
477	47689	2346.74	2346.74	0.00	189	189	0
476	47643	2345.12	2345.07	-0.05	189	189	0
473	47309	2341.51	2341.48	-0.03	115	115	0
465	46529	2336.11	2336.11	0.00	290	290	0
462	46190	2335.65	2335.65	0.00	160	160	0
461	46132	2330.23	2330.23	0.00	84	84	0
459	45869	2329.48	2329.48	0.00	269	269	0
456	45630	2329.29	2329.29	0.00	174	174	0
456	45590	2327.35	2327.35	0.00	174	174	0
456	45585	2327.45	2327.45	0.00	209	209	0
455	45548	2325.57	2325.57	0.00	129	129	0
453	45267	2322.16	2322.16	0.00	167	167	0
447	44660	2315.63	2315.6	0.00	167	167	0

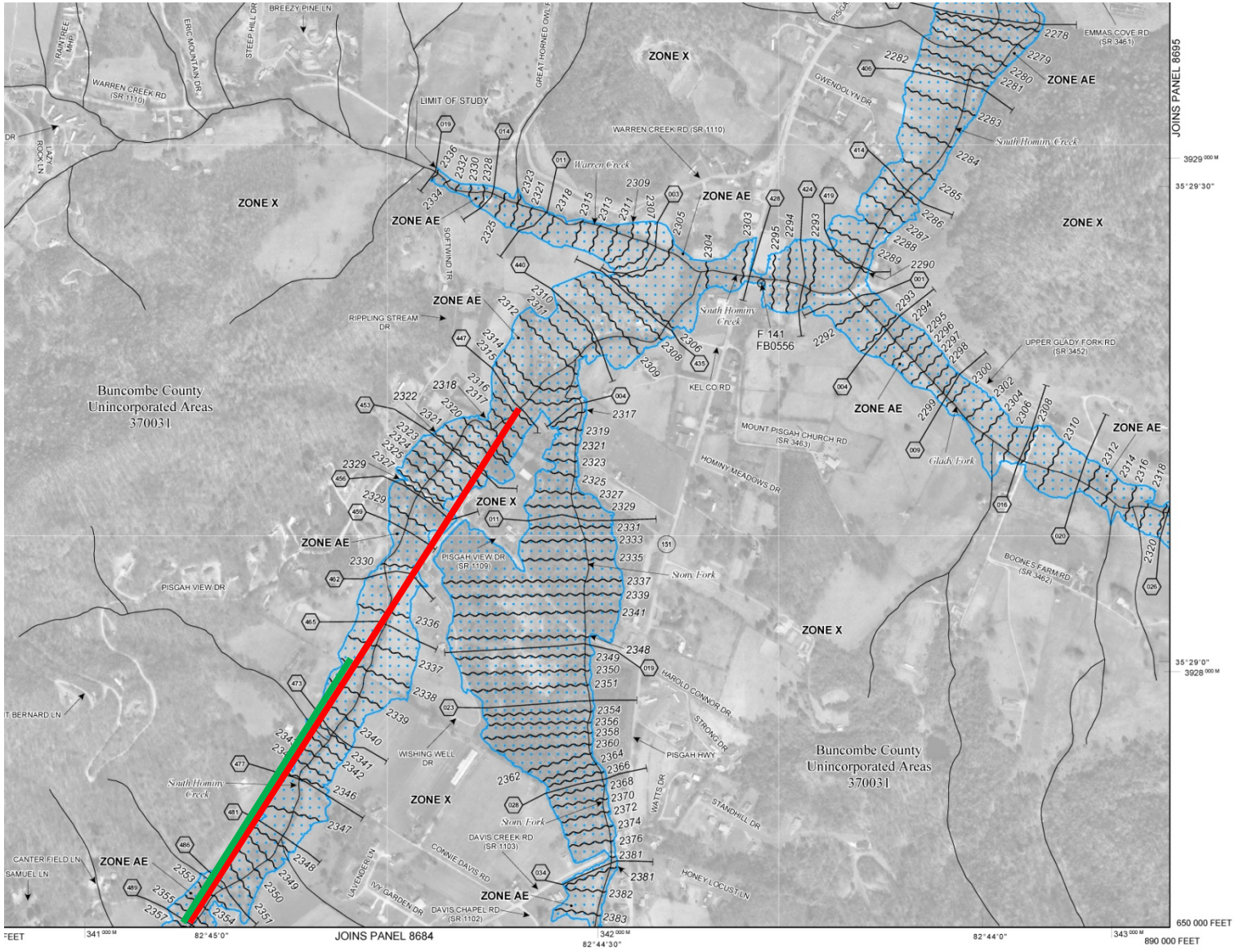
Conclusion

Our analyses indicate that the proposed creek restoration and enhancement project will not cause a rise in the base flood elevations or an increase in non-encroachment widths. We recommend that the project be permitted as designed.

APPENDIX A

ANNOTATED FIRMs

LIMITED DETAILED FLOOD HAZARD DATA TABLE



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 8685J

FIRM

FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 8685

(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

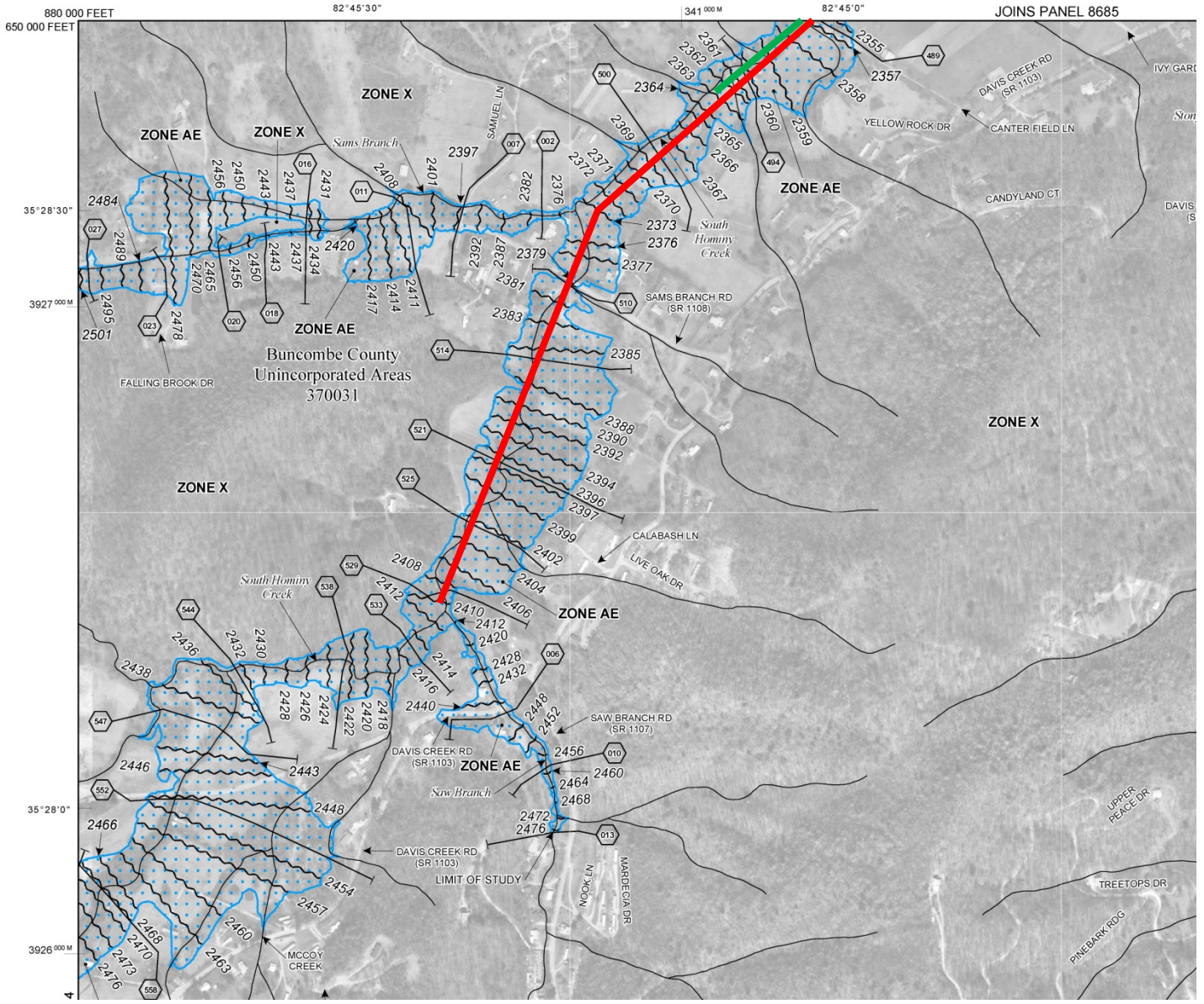
COMMUNITY	CID No.	PANEL	SUFFIX
BUNCOMBE COUNTY	370031	8685	J

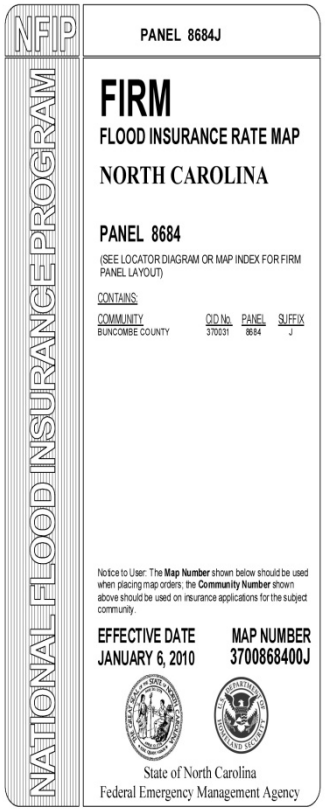
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

EFFECTIVE DATE
JANUARY 6, 2010

MAP NUMBER
3700868500J

State of North Carolina
Federal Emergency Management Agency





Work Reach

Study Reach

Table 12—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[4] *(feet)*
SOUTH HOMINY CREEK				
272	27,210[5]	5,730	2,210.2	46 / 46
278	27,839[5]	5,730	2,213.5	39 / 38
283	28,270[5]	5,730	2,215.8	40 / 41
286	28,639[5]	5,730	2,219.7	15 / 121
287	28,689[5]	5,730	2,222.4	32 / 121
290	28,967[5]	5,730	2,223.5	41 / 42
295	29,479[5]	5,640	2,224.3	129 / 34
303	30,254[5]	5,640	2,225.5	81 / 45
307	30,710[5]	5,640	2,226.5	33 / 33
311	31,059[5]	5,640	2,230.2	52 / 64
311	31,118[5]	5,640	2,232.6	113 / 82
315	31,465[5]	5,640	2,233.0	84 / 40
321	32,103[5]	5,640	2,234.4	225 / 65
328	32,774[5]	5,420	2,235.3	280 / 35
336	33,622[5]	5,420	2,240.2	164 / 34
343	34,250[5]	4,970	2,244.0	46 / 50
348	34,776[5]	4,970	2,247.2	39 / 114
349	34,913[5]	4,970	2,251.7	118 / 141
355	35,516[5]	4,970	2,252.7	81 / 101
364	36,409[5]	4,970	2,256.5	28 / 25
371	37,112[5]	4,970	2,261.6	37 / 38
376	37,580[5]	4,970	2,263.4	56 / 94
380	38,004[5]	4,970	2,266.4	32 / 40
381	38,063[5]	4,970	2,273.9	40 / 42
390	39,004[5]	4,970	2,274.9	115 / 418
399	39,874[5]	4,900	2,277.8	190 / 30
406	40,571[5]	4,900	2,282.2	205 / 37
414	41,371[5]	4,900	2,285.8	119 / 33
419	41,946[5]	4,900	2,290.1	36 / 34
424	42,414[5]	4,270	2,293.2	78 / 38
428	42,764[5]	4,270	2,296.5	35 / 35
428	42,818[5]	4,270	2,303.3	50 / 50
433	43,309[5]	4,270	2,304.7	312 / 107
435	43,502[5]	3,610	2,306.1	438 / 49
440	43,993[5]	3,610	2,309.8	145 / 32
447	44,660[5]	2,580	2,315.6	43 / 124
453	45,267[5]	2,580	2,322.2	30 / 137
455	45,548[5]	2,580	2,325.6	93 / 36
456	45,585[5]	2,580	2,327.4	193 / 16
456	45,590[5]	2,580	2,327.4	40 / 134
456	45,630[5]	2,580	2,329.3	41 / 133
459	45,869[5]	2,580	2,329.5	107 / 162
461	46,132[5]	2,580	2,330.2	44 / 40

Table 12—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[4] *(feet)*
SOUTH HOMINY CREEK				
462	46,190[5]	2,580	2,335.6	80 / 80
465	46,529[5]	2,580	2,336.1	128 / 162
473	47,309[5]	2,580	2,340.8	44 / 72
476	47,643[5]	2,580	2,344.7	29 / 160
477	47,689[5]	2,580	2,346.3	127 / 195
481	48,073[5]	2,580	2,347.5	68 / 27
486	48,578[5]	2,580	2,351.9	35 / 86
489	48,910[5]	2,470	2,355.5	59 / 72
490	48,966[5]	2,470	2,357.2	59 / 72
494	49,373[5]	2,470	2,360.1	24 / 60
500	50,007[5]	2,470	2,368.3	25 / 116
505	50,524[5]	2,470	2,373.8	16 / 41
509	50,921[5]	2,170	2,378.1	50 / 50
510	50,987[5]	2,170	2,379.3	39 / 36
514	51,423[5]	2,170	2,385.8	124 / 108
521	52,072[5]	2,170	2,396.6	144 / 120
524	52,446[5]	2,120	2,401.6	25 / 175
525	52,484[5]	2,120	2,402.5	25 / 175
529	52,910[5]	2,120	2,409.0	170 / 61
533	53,257[5]	1,910	2,414.9	15 / 117
538	53,776[5]	1,910	2,422.4	25 / 104
544	54,366[5]	1,910	2,432.6	24 / 216
547	54,745[5]	1,510	2,440.1	167 / 131
551	55,111[5]	1,510	2,447.7	24 / 25
552	55,172[5]	1,510	2,453.2	150 / 16
558	55,831[5]	1,510	2,468.3	87 / 82
576	57,611[5]	1,510	2,518.7	66 / 33
582	58,167[5]	1,440	2,533.5	19 / 31
586	58,560[5]	1,440	2,547.9	29 / 19
586	58,628[5]	1,440	2,555.4	39 / 40
590	58,986[5]	1,440	2,559.6	141 / 69
SOUTH HOMINY CREEK TRIBUTARY 2				
001	109[5]	870	2,150.0[3]	14 / 13
003	304[5]	870	2,151.4	35 / 9
005	513[5]	870	2,154.0	8 / 22
007	740[5]	870	2,156.7	15 / 14
009	924[5]	870	2,160.8	40 / 12
012	1,156[5]	870	2,163.9	16 / 18
015	1,517[5]	870	2,170.3	8 / 8
016	1,603[5]	870	2,180.6	24 / 60
SOUTH TURKEY CREEK				
001	90[5]	3,325	2,026.7	218 / 23
004	359[5]	3,325	2,028.4	91 / 24

APPENDIX B

HEC-RAS OUTPUT

DUPLICATE EFFECTIVE MODEL

EXISTING CONDITIONS MODEL

PROPOSED CONDITIONS MODEL

HEC-RAS Plan: Floodway Run River: South Hominy Cre Reach: Reach-1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	52910	100-year	2120.00	2402.74	2408.96	2408.96	2410.10	0.006843	9.98	474.04	408.64	0.72
Reach-1	52910	100-FW	2120.00	2402.74	2409.00	2409.00	2410.08	0.006483	9.76	482.91	230.70	0.70
Reach-1	52484	100-year	2120.00	2395.79	2402.48	2402.03	2402.88	0.002989	6.55	691.39	368.25	0.48
Reach-1	52484	100-FW	2120.00	2395.79	2402.84	2402.22	2403.39	0.003379	7.24	534.54	200.20	0.51
Reach-1	52465		Bridge									
Reach-1	52446	100-year	2120.00	2395.61	2401.58	2401.58	2402.26	0.005947	8.64	538.44	338.19	0.66
Reach-1	52446	100-FW	2120.00	2395.61	2401.85	2401.85	2402.75	0.006560	9.38	433.39	200.20	0.70
Reach-1	52072	100-year	2170.00	2389.33	2396.62	2396.62	2397.36	0.006299	9.37	640.26	521.59	0.62
Reach-1	52072	100-FW	2170.00	2389.33	2396.62	2396.62	2397.46	0.006791	9.74	562.92	264.24	0.64
Reach-1	51423	100-year	2170.00	2378.27	2385.75	2385.75	2386.74	0.005446	10.02	526.05	401.26	0.65
Reach-1	51423	100-FW	2170.00	2378.27	2385.75	2385.75	2386.74	0.005446	10.02	524.74	232.44	0.65
Reach-1	50987	100-year	2170.00	2371.00	2379.91	2379.91	2381.52	0.006566	11.88	303.40	207.61	0.72
Reach-1	50987	100-FW	2170.00	2371.00	2379.70	2379.70	2381.46	0.007307	12.33	283.54	74.71	0.75
Reach-1	50958		Bridge									
Reach-1	50921	100-year	2170.00	2370.75	2378.14	2378.14	2379.66	0.008913	12.16	307.82	266.71	0.81
Reach-1	50921	100-FW	2170.00	2370.75	2378.34	2378.14	2379.71	0.007887	11.65	327.44	100.00	0.76
Reach-1	50524	100-year	2470.00	2367.66	2373.75	2373.51	2374.86	0.008662	10.17	490.38	337.47	0.77
Reach-1	50524	100-FW	2470.00	2367.66	2374.12	2373.74	2375.97	0.010649	11.79	265.84	56.28	0.86
Reach-1	50007	100-year	2470.00	2363.32	2368.33	2368.33	2369.51	0.012799	11.01	435.57	289.82	0.92
Reach-1	50007	100-FW	2470.00	2363.32	2368.38	2368.38	2369.69	0.013317	11.33	402.61	140.47	0.94
Reach-1	49373	100-year	2470.00	2353.64	2360.13	2360.13	2361.03	0.006896	9.32	463.68	255.90	0.69
Reach-1	49373	100-FW	2470.00	2353.64	2360.36	2360.36	2362.02	0.009726	11.37	285.81	84.13	0.83
Reach-1	48966	100-year	2470.00	2349.46	2357.21	2355.17	2357.36	0.001115	4.14	1075.49	381.88	0.29
Reach-1	48966	100-FW	2470.00	2349.46	2357.63	2355.23	2358.04	0.002021	5.81	617.89	131.41	0.39
Reach-1	48940		Bridge									
Reach-1	48910	100-year	2470.00	2348.57	2355.49	2355.49	2356.15	0.008671	8.50	560.55	379.24	0.62
Reach-1	48910	100-FW	2470.00	2348.57	2356.35	2355.83	2357.22	0.007965	8.93	415.81	131.41	0.61
Reach-1	48578	100-year	2580.00	2346.98	2351.84		2352.71	0.011444	9.16	590.20	378.44	0.86
Reach-1	48578	100-FW	2580.00	2346.98	2352.60		2354.00	0.010889	10.16	347.37	110.84	0.86
Reach-1	48073	100-year	2580.00	2341.19	2347.52		2348.24	0.006046	8.46	582.84	313.13	0.64
Reach-1	48073	100-FW	2580.00	2341.19	2347.71		2349.05	0.008611	10.33	353.10	95.07	0.77
Reach-1	47689	100-year	2580.00	2338.16	2346.32	2343.65	2346.58	0.001417	5.28	969.05	334.34	0.34
Reach-1	47689	100-FW	2580.00	2338.16	2346.34	2344.57	2346.59	0.001373	5.21	973.29	322.00	0.34
Reach-1	47666		Bridge									
Reach-1	47643	100-year	2580.00	2337.87	2344.65	2344.65	2345.84	0.008343	10.12	447.10	210.85	0.77
Reach-1	47643	100-FW	2580.00	2337.87	2344.73	2344.69	2345.82	0.007651	9.78	456.08	189.40	0.74
Reach-1	47309	100-year	2580.00	2335.50	2340.78	2340.78	2341.56	0.009322	8.97	495.50	289.90	0.78
Reach-1	47309	100-FW	2580.00	2335.50	2341.24	2341.22	2342.64	0.011642	10.75	329.45	115.37	0.89
Reach-1	46529	100-year	2580.00	2329.48	2336.11		2336.42	0.003125	6.30	812.22	431.56	0.46
Reach-1	46529	100-FW	2580.00	2329.48	2336.90		2337.10	0.001649	4.98	899.75	290.04	0.34
Reach-1	46190	100-year	2580.00	2326.35	2335.65	2329.67	2335.71	0.000344	2.34	1601.99	381.05	0.14
Reach-1	46190	100-FW	2580.00	2326.35	2336.61	2329.67	2336.70	0.000390	2.66	1199.42	160.00	0.15
Reach-1	46162		Culvert									
Reach-1	46132	100-year	2580.00	2325.20	2330.23	2328.52	2330.92	0.006104	6.68	394.11	220.31	0.53
Reach-1	46132	100-FW	2580.00	2325.20	2330.70	2328.52	2331.28	0.004491	6.09	433.93	83.60	0.46
Reach-1	45869	100-year	2580.00	2322.51	2329.48	2327.00	2329.69	0.001407	4.50	1077.77	509.33	0.33
Reach-1	45869	100-FW	2580.00	2322.51	2330.22	2327.02	2330.36	0.000853	3.79	1248.26	269.20	0.26
Reach-1	45630	100-year	2580.00	2320.92	2329.29	2326.92	2329.37	0.000693	3.54	1857.61	693.63	0.23
Reach-1	45630	100-FW	2580.00	2320.92	2329.77	2327.16	2330.05	0.001564	5.55	916.60	173.98	0.36
Reach-1	45602		Bridge									

HEC-RAS Plan: Floodway Run River: South Hominy Cre Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	45590	100-year	2580.00	2320.07	2327.35	2327.35	2328.52	0.006590	9.92	461.77	395.38	0.71
Reach-1	45590	100-FW	2580.00	2320.07	2328.31	2327.24	2329.03	0.003535	8.00	544.21	173.98	0.53
Reach-1	45585	100-year	2580.00	2319.93	2327.45	2326.99	2328.32	0.005122	9.13	591.32	429.53	0.63
Reach-1	45585	100-FW	2580.00	2319.93	2328.33	2326.98	2328.98	0.003254	7.91	594.19	209.33	0.51
Reach-1	45569		Bridge									
Reach-1	45548	100-year	2580.00	2319.78	2325.57	2325.57	2326.34	0.008753	8.60	567.79	348.10	0.76
Reach-1	45548	100-FW	2580.00	2319.78	2326.03	2326.03	2327.45	0.010926	10.33	354.31	128.81	0.87
Reach-1	45267	100-year	2580.00	2317.74	2322.16		2322.67	0.009235	8.00	663.28	461.70	0.76
Reach-1	45267	100-FW	2580.00	2317.74	2322.54		2323.69	0.013366	10.31	386.31	166.98	0.93
Reach-1	44660	100-year	2580.00	2311.35	2315.63	2315.53	2316.28	0.012174	7.49	529.55	416.38	0.71
Reach-1	44660	100-FW	2580.00	2311.35	2316.16	2315.49	2316.78	0.008878	7.02	460.88	166.89	0.62

HEC-RAS Plan: EXISTING R2 River: South Hominy Cre Reach: Reach-1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	52910	100-year	2120.00	2402.74	2408.96	2408.96	2410.10	0.006843	9.98	474.04	408.64	0.72
Reach-1	52910	100-FW	2120.00	2402.74	2409.00	2409.00	2410.08	0.006483	9.76	482.91	230.70	0.70
Reach-1	52484	100-year	2120.00	2395.79	2402.48	2402.03	2402.88	0.002989	6.55	691.39	368.25	0.48
Reach-1	52484	100-FW	2120.00	2395.79	2402.84	2402.22	2403.39	0.003379	7.24	534.54	200.20	0.51
Reach-1	52465		Bridge									
Reach-1	52446	100-year	2120.00	2395.61	2401.58	2401.58	2402.26	0.005947	8.64	538.44	338.19	0.66
Reach-1	52446	100-FW	2120.00	2395.61	2401.85	2401.85	2402.75	0.006560	9.38	433.39	200.20	0.70
Reach-1	52072	100-year	2170.00	2389.33	2396.62	2396.62	2397.36	0.006299	9.37	640.26	521.59	0.62
Reach-1	52072	100-FW	2170.00	2389.33	2396.62	2396.62	2397.46	0.006791	9.74	562.92	264.24	0.64
Reach-1	51423	100-year	2170.00	2378.27	2385.75	2385.75	2386.74	0.005446	10.02	526.05	401.26	0.65
Reach-1	51423	100-FW	2170.00	2378.27	2385.75	2385.75	2386.74	0.005446	10.02	524.74	232.44	0.65
Reach-1	50987	100-year	2170.00	2371.00	2379.91	2379.91	2381.52	0.006566	11.88	303.40	207.61	0.72
Reach-1	50987	100-FW	2170.00	2371.00	2379.70	2379.70	2381.46	0.007307	12.33	283.54	74.71	0.75
Reach-1	50958		Bridge									
Reach-1	50921	100-year	2170.00	2370.75	2378.14	2378.14	2379.66	0.008913	12.16	307.82	266.71	0.81
Reach-1	50921	100-FW	2170.00	2370.75	2378.59	2378.14	2379.77	0.006619	10.92	352.57	100.00	0.70
Reach-1	50524	100-year	2470.00	2367.66	2373.75	2373.51	2374.86	0.008678	10.18	489.96	336.27	0.77
Reach-1	50524	100-FW	2470.00	2367.66	2373.74	2373.74	2375.92	0.013676	12.76	244.25	56.28	0.97
Reach-1	50007	100-year	2470.00	2363.32	2368.33	2368.33	2369.51	0.012799	11.01	435.57	289.82	0.92
Reach-1	50007	100-FW	2470.00	2363.32	2369.08	2368.38	2369.89	0.007228	9.18	499.87	140.47	0.71
Reach-1	49373	100-year	2470.00	2355.00	2361.23	2361.23	2361.91	0.010122	8.39	530.40	350.75	0.71
Reach-1	49373	100-FW	2470.00	2355.00	2361.70	2361.68	2363.44	0.016287	11.40	279.73	84.00	0.91
Reach-1	48966	100-year	2470.00	2351.00	2357.45	2356.73	2357.74	0.002505	5.82	851.58	399.65	0.43
Reach-1	48966	100-FW	2470.00	2351.00	2358.56	2356.67	2359.00	0.002342	6.33	600.28	128.00	0.43
Reach-1	48940		Bridge									
Reach-1	48910	100-year	2470.00	2350.00	2356.33	2356.33	2356.98	0.008830	8.29	616.27	405.62	0.63
Reach-1	48910	100-FW	2470.00	2350.00	2356.34	2356.29	2357.66	0.014450	10.61	361.12	131.41	0.81
Reach-1	48578	100-year	2580.00	2345.00	2352.60	2352.60	2353.51	0.006877	8.29	545.21	375.55	0.69
Reach-1	48578	100-FW	2580.00	2345.00	2353.33		2354.19	0.005016	7.75	421.13	111.00	0.60
Reach-1	48073	100-year	2580.00	2343.00	2348.27	2348.03	2348.80	0.007341	7.58	602.56	350.88	0.69
Reach-1	48073	100-FW	2580.00	2343.00	2348.88	2348.76	2350.50	0.012442	10.91	316.49	95.00	0.92
Reach-1	47689	100-year	2580.00	2339.00	2346.74	2345.04	2346.95	0.001506	4.75	997.28	334.25	0.34
Reach-1	47689	100-FW	2580.00	2339.00	2346.82	2345.04	2347.10	0.001737	5.15	759.13	189.40	0.36
Reach-1	47666		Bridge									
Reach-1	47643	100-year	2580.00	2338.00	2345.12	2345.12	2346.11	0.007318	9.28	499.22	254.47	0.72
Reach-1	47643	100-FW	2580.00	2338.00	2345.51	2345.09	2346.29	0.005348	8.32	524.29	189.40	0.62
Reach-1	47309	100-year	2580.00	2336.00	2341.51	2341.51	2342.17	0.010145	8.77	567.91	408.65	0.80
Reach-1	47309	100-FW	2580.00	2336.00	2342.22	2342.22	2343.61	0.012353	10.88	338.78	115.00	0.91
Reach-1	46529	100-year	2580.00	2329.48	2336.11		2336.42	0.003125	6.30	812.22	431.56	0.46
Reach-1	46529	100-FW	2580.00	2329.48	2336.90		2337.10	0.001649	4.98	899.75	290.04	0.34
Reach-1	46190	100-year	2580.00	2326.35	2335.65	2329.67	2335.71	0.000344	2.34	1601.99	381.05	0.14
Reach-1	46190	100-FW	2580.00	2326.35	2336.61	2329.67	2336.70	0.000390	2.66	1199.42	160.00	0.15
Reach-1	46162		Culvert									
Reach-1	46132	100-year	2580.00	2325.20	2330.23	2328.52	2330.92	0.006104	6.68	394.11	220.31	0.53
Reach-1	46132	100-FW	2580.00	2325.20	2330.70	2328.52	2331.28	0.004491	6.09	433.93	83.60	0.46
Reach-1	45869	100-year	2580.00	2322.51	2329.48	2327.00	2329.69	0.001407	4.50	1077.77	509.33	0.33
Reach-1	45869	100-FW	2580.00	2322.51	2330.22	2327.02	2330.36	0.000853	3.79	1248.26	269.20	0.26
Reach-1	45630	100-year	2580.00	2320.92	2329.29	2326.92	2329.37	0.000693	3.54	1857.61	693.63	0.23
Reach-1	45630	100-FW	2580.00	2320.92	2329.77	2327.16	2330.05	0.001564	5.55	916.60	173.98	0.36
Reach-1	45602		Bridge									

HEC-RAS Plan: EXISTING R2 River: South Hominy Cre Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	45590	100-year	2580.00	2320.07	2327.35	2327.35	2328.52	0.006590	9.92	461.77	395.38	0.71
Reach-1	45590	100-FW	2580.00	2320.07	2328.31	2327.24	2329.03	0.003535	8.00	544.21	173.98	0.53
Reach-1	45585	100-year	2580.00	2319.93	2327.45	2326.99	2328.32	0.005122	9.13	591.32	429.53	0.63
Reach-1	45585	100-FW	2580.00	2319.93	2328.33	2326.98	2328.98	0.003254	7.91	594.19	209.33	0.51
Reach-1	45569		Bridge									
Reach-1	45548	100-year	2580.00	2319.78	2325.57	2325.57	2326.34	0.008753	8.60	567.79	348.10	0.76
Reach-1	45548	100-FW	2580.00	2319.78	2326.03	2326.03	2327.45	0.010926	10.33	354.31	128.81	0.87
Reach-1	45267	100-year	2580.00	2317.74	2322.16		2322.67	0.009235	8.00	663.28	461.70	0.76
Reach-1	45267	100-FW	2580.00	2317.74	2322.54		2323.69	0.013366	10.31	386.31	166.98	0.93
Reach-1	44660	100-year	2580.00	2311.35	2315.63	2315.53	2316.28	0.012174	7.49	529.55	416.38	0.71
Reach-1	44660	100-FW	2580.00	2311.35	2316.16	2315.49	2316.78	0.008878	7.02	460.88	166.89	0.62

HEC-RAS Plan: proposed River: South Hominy Cre Reach: Reach-1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	52910	100-year	2120.00	2402.74	2408.96	2408.96	2410.10	0.006843	9.98	474.04	408.64	0.72
Reach-1	52910	100-FW	2120.00	2402.74	2409.00	2409.00	2410.08	0.006483	9.76	482.91	230.70	0.70
Reach-1	52484	100-year	2120.00	2395.79	2402.48	2402.03	2402.88	0.002989	6.55	691.39	368.25	0.48
Reach-1	52484	100-FW	2120.00	2395.79	2402.84	2402.22	2403.39	0.003379	7.24	534.54	200.20	0.51
Reach-1	52465		Bridge									
Reach-1	52446	100-year	2120.00	2395.61	2401.58	2401.58	2402.26	0.005947	8.64	538.44	338.19	0.66
Reach-1	52446	100-FW	2120.00	2395.61	2401.85	2401.85	2402.75	0.006560	9.38	433.39	200.20	0.70
Reach-1	52072	100-year	2170.00	2389.33	2396.62	2396.62	2397.36	0.006299	9.37	640.26	521.59	0.62
Reach-1	52072	100-FW	2170.00	2389.33	2396.62	2396.62	2397.46	0.006791	9.74	562.92	264.24	0.64
Reach-1	51423	100-year	2170.00	2378.27	2385.75	2385.75	2386.74	0.005446	10.02	526.05	401.26	0.65
Reach-1	51423	100-FW	2170.00	2378.27	2385.75	2385.75	2386.74	0.005446	10.02	524.74	232.44	0.65
Reach-1	50987	100-year	2170.00	2371.00	2379.91	2379.91	2381.52	0.006566	11.88	303.40	207.61	0.72
Reach-1	50987	100-FW	2170.00	2371.00	2379.70	2379.70	2381.46	0.007307	12.33	283.54	74.71	0.75
Reach-1	50958		Bridge									
Reach-1	50921	100-year	2170.00	2370.75	2378.14	2378.14	2379.66	0.008913	12.16	307.82	266.71	0.81
Reach-1	50921	100-FW	2170.00	2370.75	2378.59	2378.14	2379.77	0.006630	10.92	352.32	100.00	0.70
Reach-1	50524	100-year	2470.00	2367.66	2373.75	2373.51	2374.86	0.008674	10.18	490.06	336.57	0.77
Reach-1	50524	100-FW	2470.00	2367.66	2373.74	2373.74	2375.92	0.013676	12.76	244.25	56.28	0.97
Reach-1	50007	100-year	2470.00	2363.32	2368.33	2368.33	2369.51	0.012799	11.01	435.57	289.82	0.92
Reach-1	50007	100-FW	2470.00	2363.32	2368.90	2368.38	2369.81	0.008393	9.66	474.49	140.47	0.76
Reach-1	49373	100-year	2470.00	2354.90	2361.23	2361.23	2361.97	0.007378	8.90	583.87	351.01	0.69
Reach-1	49373	100-FW	2470.00	2354.90	2361.37	2361.37	2363.21	0.013244	12.14	306.52	84.00	0.93
Reach-1	48966	100-year	2470.00	2351.00	2357.45	2356.73	2357.74	0.002505	5.82	851.58	399.65	0.43
Reach-1	48966	100-FW	2470.00	2351.00	2358.56	2356.67	2359.00	0.002343	6.33	600.24	128.00	0.43
Reach-1	48940		Bridge									
Reach-1	48910	100-year	2470.00	2350.00	2356.33	2356.33	2356.98	0.008830	8.29	616.27	405.62	0.63
Reach-1	48910	100-FW	2470.00	2350.00	2356.34	2356.29	2357.66	0.014420	10.61	361.44	131.41	0.81
Reach-1	48578	100-year	2580.00	2345.00	2352.60	2352.60	2353.54	0.006727	8.54	557.27	375.53	0.69
Reach-1	48578	100-FW	2580.00	2345.00	2353.40		2354.26	0.004649	7.87	441.14	111.00	0.59
Reach-1	48073	100-year	2580.00	2342.20	2348.26	2348.16	2348.90	0.007577	8.64	603.54	350.67	0.72
Reach-1	48073	100-FW	2580.00	2342.20	2348.90	2348.90	2350.73	0.012585	12.17	333.58	95.00	0.95
Reach-1	47689	100-year	2580.00	2338.50	2346.74	2344.99	2346.96	0.001464	4.74	1008.46	334.42	0.33
Reach-1	47689	100-FW	2580.00	2338.50	2346.82	2344.99	2347.11	0.001708	5.16	766.11	189.40	0.36
Reach-1	47666		Bridge									
Reach-1	47643	100-year	2580.00	2337.50	2345.07	2345.07	2346.09	0.006805	9.68	524.30	252.54	0.70
Reach-1	47643	100-FW	2580.00	2337.50	2345.58	2345.03	2346.30	0.004521	8.33	574.21	189.40	0.58
Reach-1	47309	100-year	2580.00	2336.00	2341.48		2342.22	0.011420	9.25	553.92	404.13	0.85
Reach-1	47309	100-FW	2580.00	2336.00	2342.34	2342.34	2343.84	0.012597	11.18	352.74	115.00	0.93
Reach-1	46529	100-year	2580.00	2329.48	2336.11		2336.42	0.003125	6.30	812.22	431.56	0.46
Reach-1	46529	100-FW	2580.00	2329.48	2336.90		2337.10	0.001649	4.98	899.75	290.04	0.34
Reach-1	46190	100-year	2580.00	2326.35	2335.65	2329.67	2335.71	0.000344	2.34	1601.99	381.05	0.14
Reach-1	46190	100-FW	2580.00	2326.35	2336.61	2329.67	2336.70	0.000390	2.66	1199.42	160.00	0.15
Reach-1	46162		Culvert									
Reach-1	46132	100-year	2580.00	2325.20	2330.23	2328.52	2330.92	0.006104	6.68	394.11	220.31	0.53
Reach-1	46132	100-FW	2580.00	2325.20	2330.70	2328.52	2331.28	0.004491	6.09	433.93	83.60	0.46
Reach-1	45869	100-year	2580.00	2322.51	2329.48	2327.00	2329.69	0.001407	4.50	1077.77	509.33	0.33
Reach-1	45869	100-FW	2580.00	2322.51	2330.22	2327.02	2330.36	0.000853	3.79	1248.26	269.20	0.26
Reach-1	45630	100-year	2580.00	2320.92	2329.29	2326.92	2329.37	0.000693	3.54	1857.61	693.63	0.23
Reach-1	45630	100-FW	2580.00	2320.92	2329.77	2327.16	2330.05	0.001564	5.55	916.60	173.98	0.36
Reach-1	45602		Bridge									

HEC-RAS Plan: proposed River: South Hominy Cre Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	45590	100-year	2580.00	2320.07	2327.35	2327.35	2328.52	0.006590	9.92	461.77	395.38	0.71
Reach-1	45590	100-FW	2580.00	2320.07	2328.31	2327.24	2329.03	0.003535	8.00	544.21	173.98	0.53
Reach-1	45585	100-year	2580.00	2319.93	2327.45	2326.99	2328.32	0.005122	9.13	591.32	429.53	0.63
Reach-1	45585	100-FW	2580.00	2319.93	2328.33	2326.98	2328.98	0.003254	7.91	594.19	209.33	0.51
Reach-1	45569		Bridge									
Reach-1	45548	100-year	2580.00	2319.78	2325.57	2325.57	2326.34	0.008753	8.60	567.79	348.10	0.76
Reach-1	45548	100-FW	2580.00	2319.78	2326.03	2326.03	2327.45	0.010926	10.33	354.31	128.81	0.87
Reach-1	45267	100-year	2580.00	2317.74	2322.16		2322.67	0.009235	8.00	663.28	461.70	0.76
Reach-1	45267	100-FW	2580.00	2317.74	2322.54		2323.69	0.013366	10.31	386.31	166.98	0.93
Reach-1	44660	100-year	2580.00	2311.35	2315.63	2315.53	2316.28	0.012174	7.49	529.55	416.38	0.71
Reach-1	44660	100-FW	2580.00	2311.35	2316.16	2315.49	2316.78	0.008878	7.02	460.88	166.89	0.62

APPENDIX C

NO-RISE CERTIFICATION

FLOODWAY "NO-RISE / NO-IMPACT" CERTIFICATION

This document is to certify that I am duly qualified engineer licensed to practice in the State of North Carolina (State). It is to further certify that the attached technical data supports the fact that proposed Restoration Project (Name of Development) will not impact the base flood elevations and non-encroachment widths on South Hominy Creek (Name of Stream) at published cross sections in the Flood Insurance Study for, Buncombe County (Name of community), dated January 6, 2010 (Date) and will not impact the base flood elevations or non-encroachment widths at the unpublished cross-sections in the area of the proposed development.

SEAL, SIGNATURE AND DATE

Andrew Bick, PE, CFM
Name

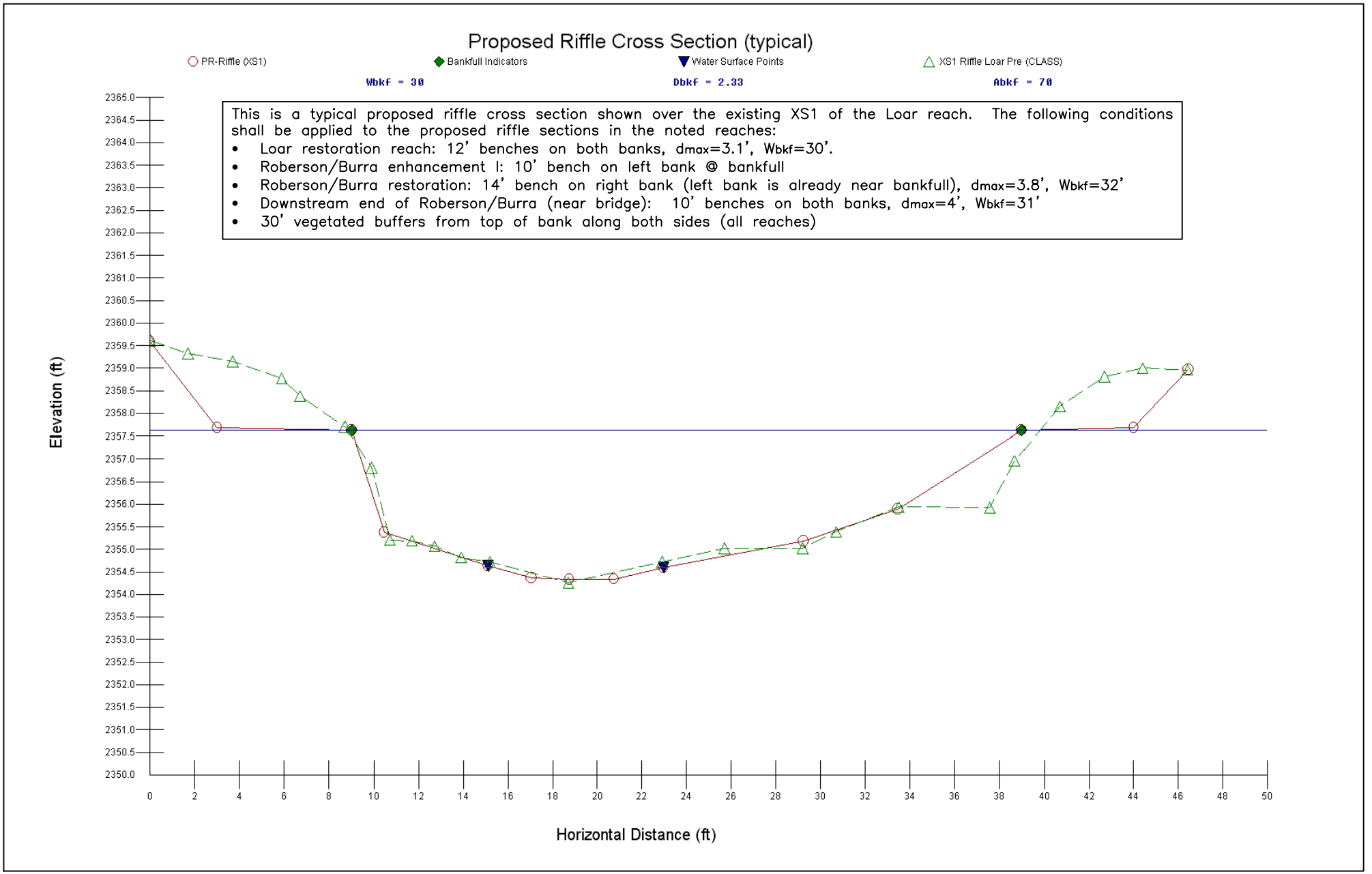
Principal
Title

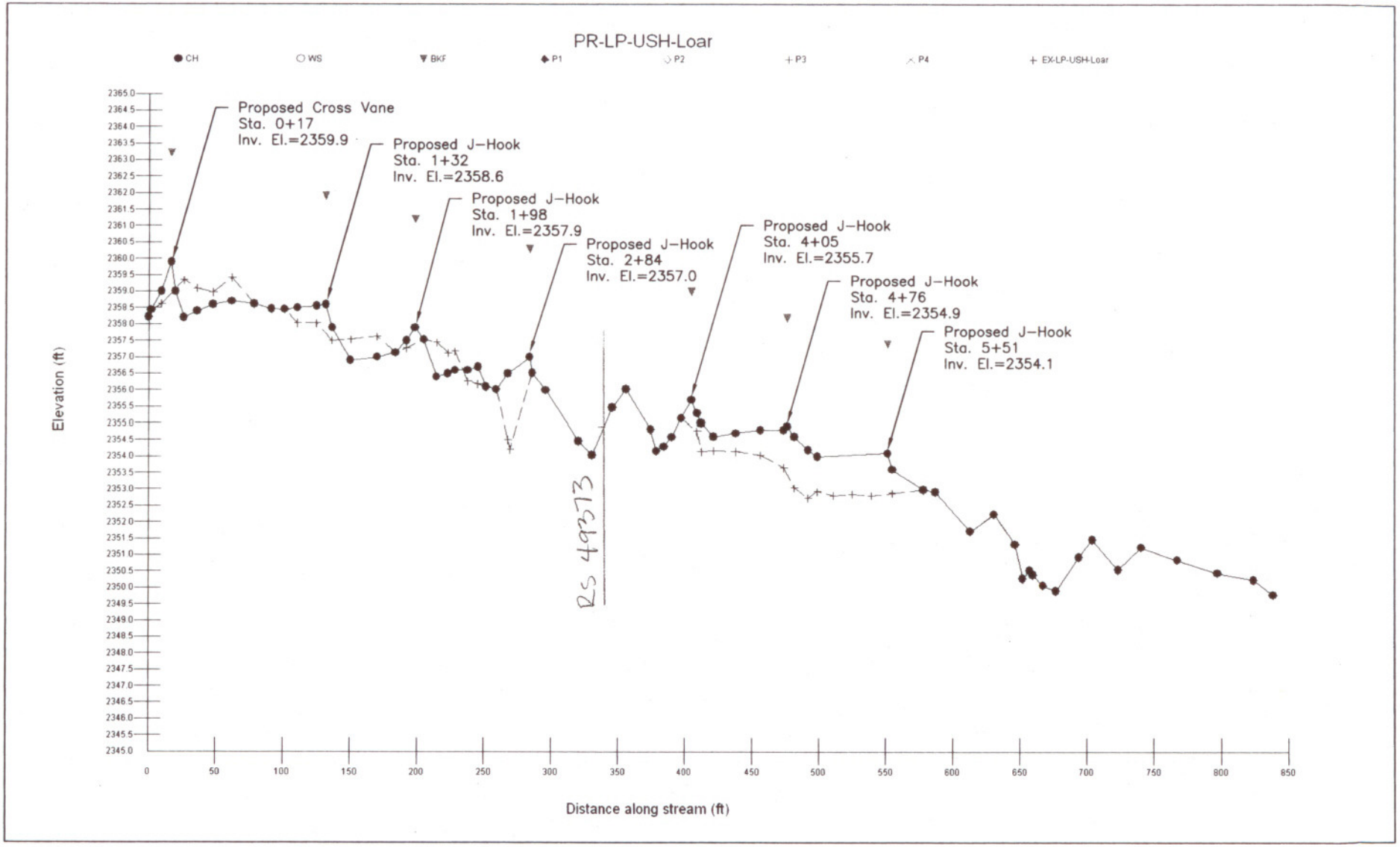
Confluence Engineering, PC

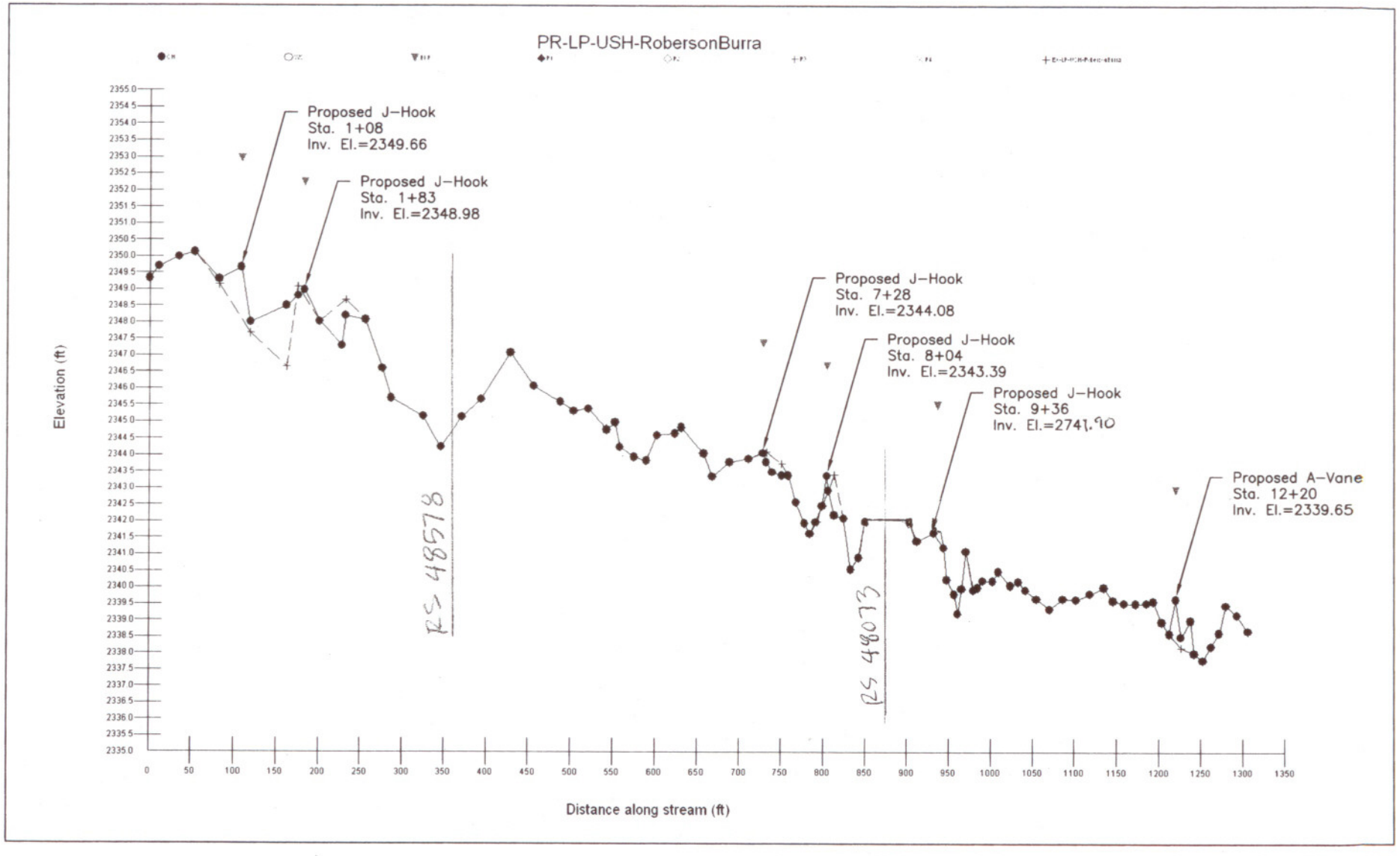
16 Broad Street, Asheville, NC 28801
Address

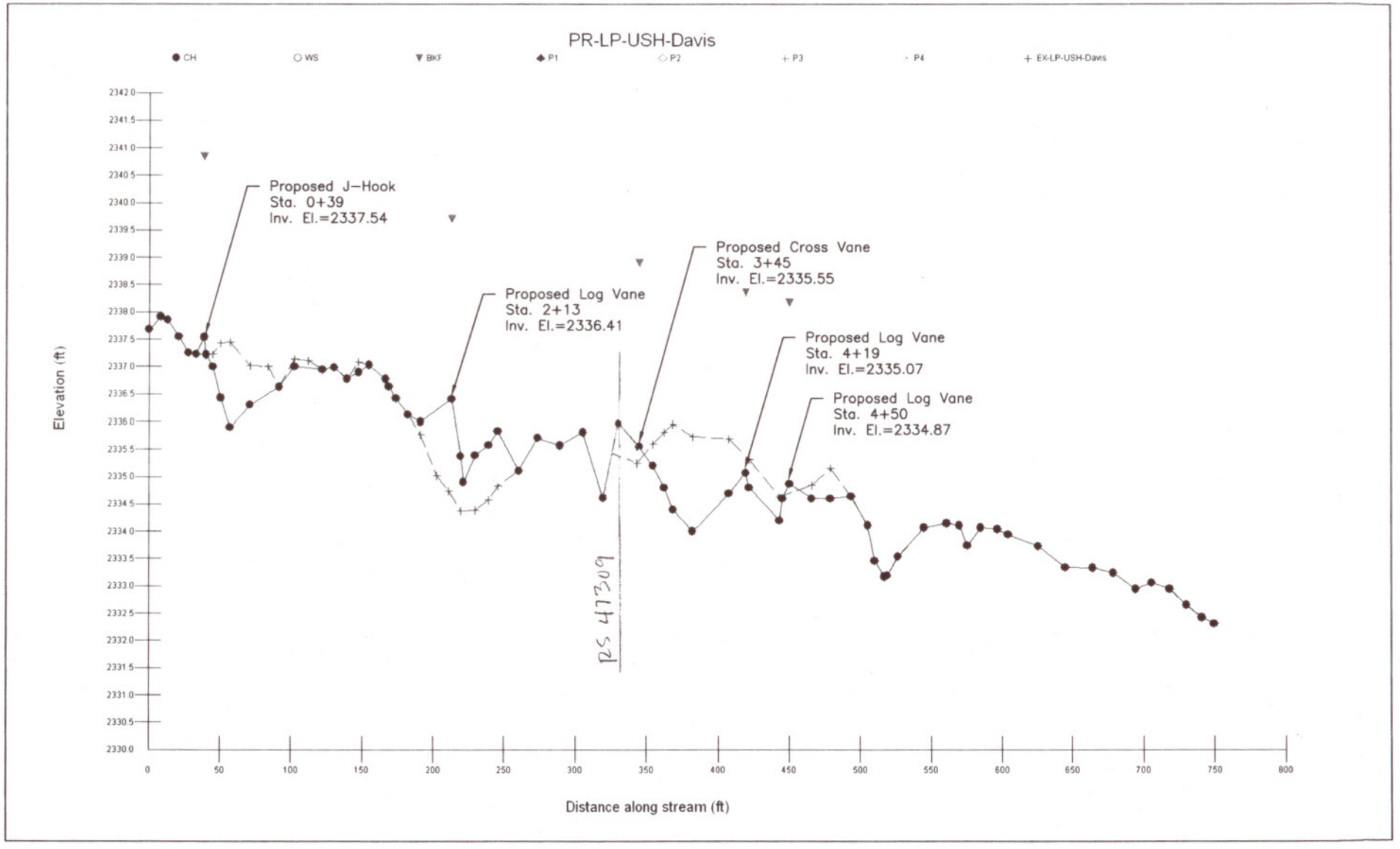
FOR COMMUNITY USE ONLY:		
Community Approval ☐ Approved ☐ Disapproved		
Community Official's Name	Community Official's Signature	Title

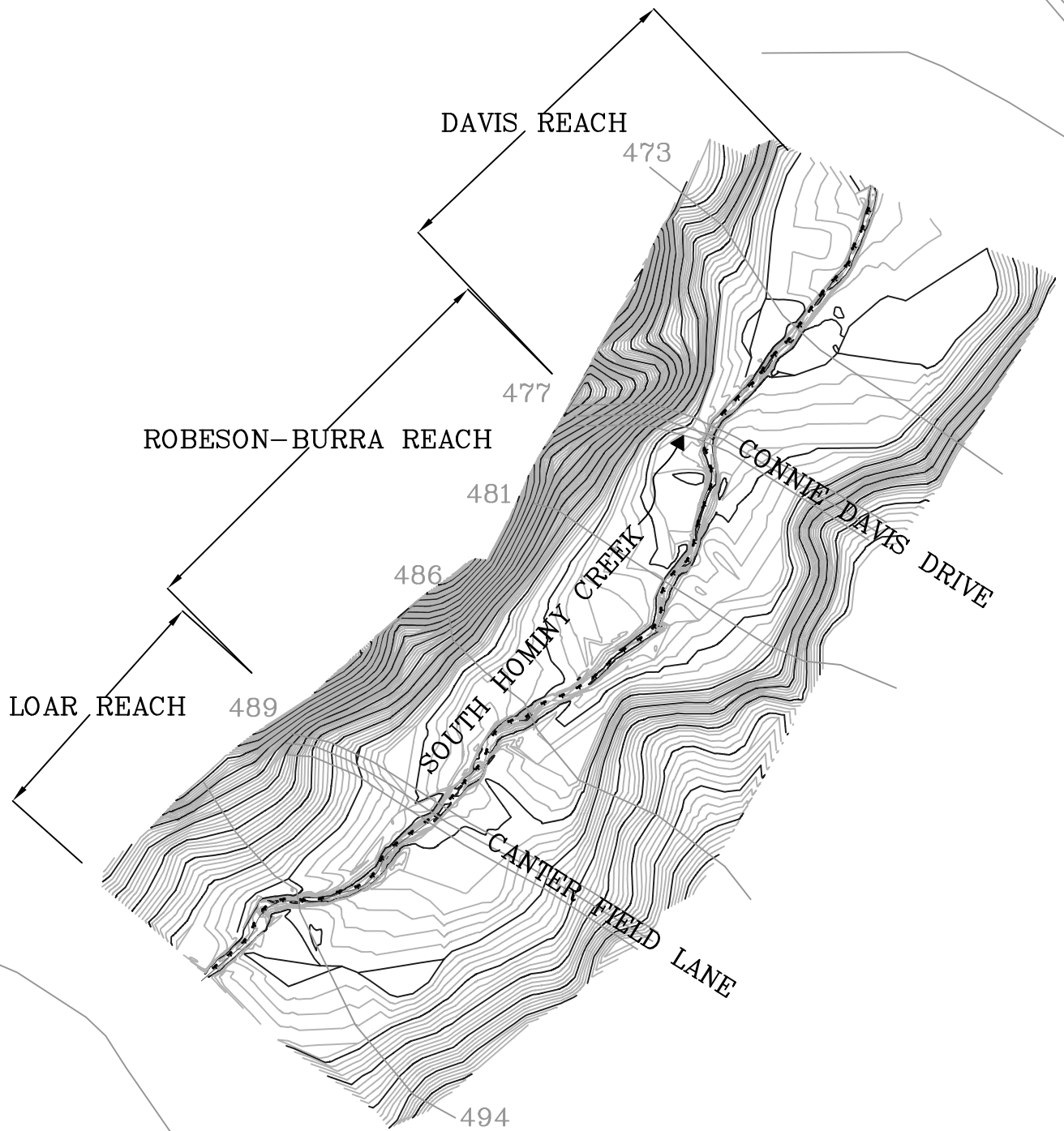
DESIGN DATA FROM
NC WILDLIFE RESOURCES COMMISSION


Proposed Riffle Cross Section (typical)
PR-Riffle (XS1)
Bankfull Indicators
Water Surface Points
XS1 Riffle Loar Pre (CLASS)
Wbkf = 30
Dbkf = 2.33
Abkf = 70
This is a typical proposed riffle cross section shown over the existing XS1 of the Loar reach. The following conditions shall be applied to the proposed riffle sections in the noted reaches:
• Loar restoration reach: 12' benches on both banks, dmax=3.1', Wbkf=30'.
• Roberson/Burra enhancement I: 10' bench on left bank @ bankfull
• Roberson/Burra restoration: 14' bench on right bank (left bank is already near bankfull), dmax=3.8', Wbkf=32'
• Downstream end of Roberson/Burra (near bridge): 10' benches on both banks, dmax=4', Wbkf=31'
• 30' vegetated buffers from top of bank along both sides (all reaches)
Elevation (ft)
2365.0
2364.5
2364.0
2363.5
2363.0
2362.5
2362.0
2361.5
2361.0
2360.5
2360.0
2359.5
2359.0
2358.5
2358.0
2357.5
2357.0
2356.5
2356.0
2355.5
2355.0
2354.5
2354.0
2353.5
2353.0
2352.5
2352.0
2351.5
2351.0
2350.5
2350.0
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
Horizontal Distance (ft)


PR-LP-USH-Loar
CH
WS
BKF
P1
P2
P3
P4
EX-LP-USH-Loar
Proposed Cross Vane
Sta. 0+17
Inv. El.=2359.9
Proposed J-Hook
Sta. 1+32
Inv. El.=2358.6
Proposed J-Hook
Sta. 1+98
Inv. El.=2357.9
Proposed J-Hook
Sta. 2+84
Inv. El.=2357.0
Proposed J-Hook
Sta. 4+05
Inv. El.=2355.7
Proposed J-Hook
Sta. 4+76
Inv. El.=2354.9
Proposed J-Hook
Sta. 5+51
Inv. El.=2354.1
RS 49373
Elevation (ft)
Distance along stream (ft)


PR-LP-USH-RobersonBurra
Proposed J–Hook
Sta. 1+08
Inv. El.=2349.66
Proposed J–Hook
Sta. 1+83
Inv. El.=2348.98
Proposed J–Hook
Sta. 7+28
Inv. El.=2344.08
Proposed J–Hook
Sta. 8+04
Inv. El.=2343.39
Proposed J–Hook
Sta. 9+36
Inv. El.=2741.90
Proposed A–Vane
Sta. 12+20
Inv. El.=2339.65
RS 485718
RS 480473
Elevation (ft)
Distance along stream (ft)


PR-LP-USH-Davis
CH
WS
BKF
P1
P2
P3
P4
EX-LP-USH-Davis
Proposed J–Hook
Sta. 0+39
Inv. El.=2337.54
Proposed Log Vane
Sta. 2+13
Inv. El.=2336.41
Proposed Cross Vane
Sta. 3+45
Inv. El.=2335.55
Proposed Log Vane
Sta. 4+19
Inv. El.=2335.07
Proposed Log Vane
Sta. 4+50
Inv. El.=2334.87
RS 47309
Elevation (ft)
Distance along stream (ft)



CONFLUENCE
ENGINEERING, PC
16 Broad Street
Asheville, North Carolina 28801
Phone: 828.255.5530
confluence-eng.com

UPPER SOUTH HOMINY CREEK
STREAM MITIGATION PROJECT
BUNCOMBE COUNTY, NC

DATE: 1/22/10

SCALE: 1" = 400'

WORKMAP

SHT 1 OF 1

Figure C.6 Continued

Confluence Engineering, PC
16 Broad Street
Asheville, NC 28801
828.255.5530

January 22, 2010

Ms. Cynthia Barcklow, AICP, CFM
Floodplain Administrator
Buncombe County Planning Department
46 Valley Street
Asheville, NC 28801

Subject: Flood Study Report
Upper South Hominy Creek Mitigation Project
Buncombe County, North Carolina

Dear Ms. Barcklow:

Enclosed please find two copies of a flood study report and no-rise certification for a proposed stream mitigation project on South Hominy Creek. A CD with the relevant HEC-RAS files and an electronic version of the report is included along with design information.

A floodplain development permit application and the permit fee are also enclosed.

I would be glad to discuss the project with you and answer any questions you may have. I can be reached at 255.5530.

Sincerely,
Confluence Engineering, PC

Andrew Bick, PE, CFM
Principal

Enclosures

Figure C.6 Continued

Buncombe County Government Planning and Development

APPLICATION FOR DEVELOPMENT PERMIT IN AREA OF SPECIAL FLOOD HAZARD

This form is to be completed by the applicant and submitted to the Floodplain Administrator.

To be completed by FLOODPLAIN ADMINISTRATOR		
Permit Application #		
Application Date		
Firm Panel #		
PIN		
Subdivision Name		
Building Permit #		
Floodplain Dev Permit Required?	☐ Yes ☐ No	**Issue Date:**

SECTION 1: General Provision (APPLICANT to read and sign):

1. No work of any kind may begin until permit is issued
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Occupancy is issued.
5. The permit will expire if no work is commenced within six months of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state, and federal regulatory requirements.
7. Applicant hereby gives consent to the Local Administrator or assigned representative to make reasonable inspections required to verify compliance.
8. To the best of my knowledge, I, the applicant, certify that all statements herein and in attachments to this application are accurate and true.
9. If permit is granted, I agree to conform to the Flood Damage Prevention Ordinance for the County of Buncombe and to all ordinances and the laws of the state of North Carolina regulating such work.

Signature of Applicant Andrew Bick Date 1/22/10

SECTION 2: Proposed Development (To be completed by APPLICANT!)
The applicant must submit the following documents before the application can be processed:

A site development plan, drawn to scale, showing the location of all existing structures, topography, water bodies, adjacent roads, lot dimensions, and proposed development, showing (where applicable) anchoring systems, proposed elevation of lowest floor (including basement), types of water-resistant materials used below the first floor, details of flood proofing of utilities located below the first floor, details of enclosures below the first floor, proposed location of fill, and proposed amount of fill.

PIN of proposed development 8685309615 (At center of site)
Address: Connie Davis Rd @ South Hominy Creek
Detailed Directions I-40 West to Smoky Park Hwy - South on Hwy 151 to Davis Creek Rd on Right - Connie Davis Rd on Rt is approximate center of site where it crosses the Creek.

Name of Owner: NC Ecosystem Enhancement Program Telephone Number(s): Harry Tsomides (PM) 545-7057
Mailing Address:

Name of Designer/ Engineer: Andrew Bick Telephone Number(s): 255-5530
Mailing Address: 16 Broad St, Asheville NC 28801

Name of Contractor: NC Wildlife Res. Commission Telephone Number(s): 231-3517 (Jeff Ferguson)
Mailing Address: 20830 Great Smoky Mtns Expwy, Waynesville, NC 28786

SECTION 2 (Continued):
Brief Description of Work The project involves restoration, enhancement and preservation of the main stem of South Fleming Creek and four unnamed tributaries.

SECTION 2A: Structural Development (Check all applicable boxes)

Activity N/A
- ☐ New Structure
- ☐ Addition
- ☐ Alteration
- ☐ Relocation
- ☐ Demolition
- ☐ Replacement

Structure Type: N/A
- ☐ Residential (1 – 4 Family)
- ☐ Residential (More than 4 Family)
- ☐ Non-residential (Floodproofing ☐ Yes)
- ☐ Combined Use (Residential and Commercial)
- ☐ Manufactured (Mobile) Home
  (In Manufactured Home Park? ☐ Yes)

Estimated Cost of Project $ N/A

SECTION 2B: Other Development Activities (Check all applicable boxes)
- ☐ Clearing ☒ Grading ☐ Fill ☐ Mining ☐ Drilling
- ☒ Excavation (Except for Structural Development Checked Above)
- ☒ Watercourse Alteration (Including Dredging and Channel Modifications)
- ☐ Drainage Improvements (Including Culvert Work)
- ☐ Road, Street, or Bridge Construction
- ☐ Subdivision (New or Expansion)
- ☐ Individual Water or Sewer System
- ☒ Other (Please Specify) Stream buffer planting

After completing SECTION 2, APPLICANT should submit form along with site development plan and permit application fee to the Floodplain Administrator for review.

To be completed by FLOODPLAIN ADMINISTRATOR

Application Review Fee
☐ $50.00 Single Family Residential ☐ $150.00 Commercial
Paid? ☐ Yes ☐ No **Date**_____

Remarks _____

Permit Officer Signature _____ **Date**_____

Figure C.7 Farmland Conversion Rating Form

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 2/17/10
Name Of Project Upper South Hominy Creek Mitigation Project	Federal Agency Involved NC Ecosystem Enhancement Program
Proposed Land Use Stream Restoration	County And State Buncombe, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 2/18/2010

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).* Yes ☑ No ☐

Acres Irrigated: —

Average Farm Size: 67 ACRES

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount Of Farmland As Defined in FPPA
HAY, CORN	Acres: 185,350 % 46	Acres: 163,173 %40
Name Of Land Evaluation System Used: BUNCOMBE CALES	Name Of Local Site Assessment System:	Date Land Evaluation Returned By NRCS: 2/25/2010

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	16.4			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	16.4	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	11.8			
B. Total Acres Statewide And Local Important Farmland	4.6			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	<.01			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	13			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	80	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	0	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	0	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	0	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

Appendix D

Existing Conditions Morphological Data

Table D.1 Existing, Reference, and Design Stream Channel Morphology Data Summary for South Hominy Creek (SHC).

Upper South Hominy Mitigation Site Channel Morphology Data Summary																			
Parameter (Riffles Only)	**Gauge**	**Regional Curve Interval**			**(SHC) Pre-Existing Condition**						**Reference Reach(es) Data**						**(SHC) Design**		
Dimension and Substrate		LL	UL	Eq.	Min	Max	Med	Mean	SD	n	Min	Max	Med	Mean	SD	n	Min	Mean	Max
Bankfull Width (ft)				30	27.2	37.3	31.1	32.0	3.6	7	28.1	37.2	30.3	31.2	3.5	5	28.1	30.7	37.2
Floodprone Width (ft)					203.0	370.0	320.0	311.3	55.6	7	64.0	329.0	104.0	146.4	106.9	5	68.4	182.2	296
Bankfull Cross-Sectional Area (ft^2)				70	50.8	81.4	70.2	69.7	9.9	7	43.8	75.5	62.0	60.7	11.6	5	43.8	61.3	75.5
Bankfull Mean Depth (ft)				2.5	1.7	2.6	2.2	2.2	0.4	7	1.5	2.2	2.0	2.0	0.3	5	1.5	2.0	2.2
Bankfull Max Depth (ft)					2.5	3.8	3.2	3.2	0.4	7	2.3	3.3	3.0	2.8	0.4	5	2.0	2.7	3.3
Width/Depth Ratio					10.5	20.1	15.0	15.0	3.5	7	12.7	20.9	16.4	16.3	3.4	5	12.0	15.4	18.6
Entrenchment Ratio					6.6	13.4	9.9	9.8	2.0	7	2.3	11.2	3.4	4.7	3.6	5	2.4	5.9	8.0
Bank Height Ratio					1.1	2.0	1.4	1.5	0.3	7	1.0	2.0	1.0	1.3	0.4	5	1.0	1.3	1.5
Bankfull Wetted Perimeter (ft)					30.0	38.7	32.8	33.8	3.3	7	30.5	38.2	31.6	32.8	3.1	5	30.5	32.8	38.15
Hydraulic Radius (ft)					1.6	2.4	2.1	2.1	0.3	7	1.4	2.1	2.0	1.8	0.3	5	1.4	1.9	2.1
D50 (mm)					17.3	39.2	24.5	26.9	8.1	7	15.2	62.3	46.5	42.6	20.8	4	15.2	42.6	62.3
Pattern																			
Channel Belt Width (ft)					28.2	97.4	46.0	56.8	26.1	6	64.7	240.0	88.0	120.2	81.8	4	53.1	154.7	256.2
Radius of Curvature (ft)					29.7	545.1	294.3	295.8	209.7	6	12.7	105.0	49.6	54.2	38.1	4	10.7	70.7	256.2
Rc:Bankfull Width (ft/ft)					0.9	17.0	9.2	9.2	6.6	6	0.5	3.4	1.6	1.8	1.2	4	0.4	2.3	6.9
Meander Wavelength (ft)					140.0	561.5	307.5	307.0	148.3	6	131.0	350.0	342.5	291.5	107.2	4	108.0	288.9	469.8
Meander Width Ratio					0.9	3.0	1.4	1.8	0.8	6	1.9	11.9	7.9	7.4	5.0	4	1.9	5.0	6.9
Profile																			
Riffle Length (ft)					12.6	85.9	53.7	53.5	21.9	14	27.7	65.0	57.5	51.9	16.8	4	15.8	52.3	86.9
Riffle Slope (ft/ft)					0.01177	0.03597	0.01733	0.01967	0.00709	14	0.01128	0.02103	0.01329	0.01472	0.00433	4	0.00737	0.01703	0.02669
Pool Length (ft)					16.0	84.1	42.2	42.7	19.6	11	27.1	41.0	30.9	32.5	6.2	4	14.7	55.7	96.7
Pool Max Depth (ft)					2.9	7.7	4.4	4.5	1.3	11	3.8	5.3	4.3	4.4	0.7	4	3.6	6.2	8.8
Pool to Pool Spacing (ft)					28.4	537.8	184.4	220.9	173.1	8	41.4	307.9	77.0	125.9	123.0	4	44.2	176.8	309.4

Table D.1 Continued

Upper South Hominy Mitigation Site Channel Morphology Data Summary														
Substrate, Bed and Transport Parameters	**Gauge**	**Regional Curve Interval**			**(SHC) Pre-Existing Condition**							**Reference Reach(es) Data**	**(SHC) Design**
aRi % / Ru % / P % / G % / S %					30		30		20	20			
aSC % / Sa % / G % / C % / B % / Be %					7.6		16.1	29.7	45.4	1.3	0.0		
aD_{16} / D_{35} / D_{50} / D_{84} / D_{95} / Di^{p} / Di^{sp}					0.23	23.9	56.6	144.4	211.0	98.0	90.0		
Reach Shear Stress (competency) lb/ft[b]					1.0 to 1.3								0.5 to1.2
Max part size (mm) mobilized at bankfull					98								71 to 160
Stream Power (transport capacity) W/m[b]													
Additional Reach Parameters													
Drainage Area (mi^2)					7.1								
Impervious cover estimate (%)					<1.0								
Rosgen Classification					C4								C4
Bankfull Velocity (fps)					4.6								4.6
Bankfull Discharge (cfs)		250		350	322								
Valley Length (ft)					2604.1								
Channel Thalweg Length (ft)					2893.7								2893.7
Sinuosity					1.11								1.11
Water Surface Slope (Channel) (ft/ft)					0.009								0.009
Bankfull Slope (ft/ft)					0.009								0.009
Bankfull Floodplain Area (acres)					0.66								1.26
Proportion Over Wide (%)					5								
Entrenchment Class (ER Range)					Low (>2.2)								
Incision Class (BHR)					Moderately Unstable (1.06-1.3) to Highly Unstable (>1.5)								
BEHI VL% / L% /M% / H% / VH% / E %					NA								
Channel Stability or Habitat Metric					NA								
Biological or Other					NA								

a Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock, (values derived from reach-wide pebble counts). Di^{p} = max pavement, Di^{sp} = max sub-pavement. Shaded cells indicate that these will typically not be filled in

b Methodology should be cited and described either here or in text

[shaded] = Non-Applicable; NA = Not Available

Table D.1a Existing, Reference, and Design Stream Channel Morphology Data Summary for Davis UT3.

Upper South Hominy Mitigation Site Channel Morphology Data Summary														
Parameter (Riffles Only)	**(UT3 Davis) Pre-Existing Condition**						**Reference Reach Basin Cr (C)**	**Reference Reach North Br (Ba)[c]**	**(UT3-upper, Ba) Design**			**(UT3-lower, C) Design**		
Dimension and Substrate	Min	Max	Med	Mean	SD	n	Mean	Mean	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	3.9	10.0	4.4	6.1	3.4	3	30.7	8.0	8.0	10.0	12.0	8.0	10.0	12.0
Floodprone Width (ft)	6.0	15.3	14.0	11.8	5.0	3	85.0	11.6	15.0	20.0	25.0	27.7	40.0	54.0
Bankfull Cross-Sectional Area (ft^2)	4.5	7.4	6.5	6.1	1.5	3	57.4	4.2	6.0	6.9	7.5	8.6	9.2	9.9
Bankfull Mean Depth (ft)	0.7	1.5	1.2	1.1	0.4	3	1.87	0.5	0.4	0.5	0.6	0.5	0.6	0.7
Bankfull Max Depth (ft)	1.1	1.8	1.4	1.4	0.4	3	2.4	0.8	1.0	1.2	1.4	0.9	1.6	2.2
Width/Depth Ratio	3.0	13.8	3.3	6.7	6.1	3	16.4	15.4	16.0	18.0	20.0	16.0	16.6	17.1
Entrenchment Ratio	1.5	3.1	1.6	2.1	0.9	3	2.8	1.5	1.9	2.2	2.5	3.5	4.0	4.5
Bank Height Ratio	3.4	3.7	3.6	3.6	0.1	3	1.0	1.0		1.0			1.0	
Bankfull Wetted Perimeter (ft)	6.0	10.4	6.7	7.7	2.4	3	32.6	N/A	10.4	10.7	10.9	10.6	11.1	11.6
Hydraulic Radius (ft)	0.7	1.0	0.8	0.8	0.2	3	1.76	N/A	0.8	1.0	1.1	0.9	1.0	1.1
D50 (mm)	N/A						38.5	27.0		20-30			10-20	
Pattern														
Channel Belt Width (ft)	6.8	39.5	23.8	24.7	14.5	7	105.0	17.0	13.8	16.8	22.3	23.6	26.8	29.7
Radius of Curvature (ft)	45.5	146.8	81.6	86.4	39.2	7	106.0	13.0	33.0	56.4	71.9	30.1	38.4	43.6
Rc:Bankfull Width (ft/ft)	5.4	17.4	9.7	10.2	4.7	7	3.5	1.6	4.1	5.6	6.0	3.0	3.8	4.4
Meander Wavelength (ft)	8.5	180.3	37.6	52.8	58.1	7	350	29.0	70.0	76.9	89.7	97.6	102.1	106.8
Meander Width Ratio	0.8	4.7	2.8	2.9	1.7	7	3.4	2.1	1.7	1.9	1.2	2.5	2.7	2.9
Profile[b]														
Riffle Length (ft)							65.0	N/A	1.8	2.0	2.2	10.0	14.0	18.0
Riffle Slope (ft/ft)							0.02103	0.14200	0.09500	0.10000	0.12000	0.01861	0.03747	0.05634
Pool Length (ft)							70.0	N/A	4.0	4.4	4.8	13.4	22.8	32.3
Pool Max Depth (ft)							5.3	0.95	1.8	2.0	2.2	1.0	1.6	2.2
Pool to Pool Spacing (ft)							90.1	68.0	22.8	23.0	23.2	22.3	27.7	33.1

[a] Only a single riffle was surveyed for the Basin Creek (6.8 mi^2) reference reach, 1998.

[b] Channel impacts and low flow precluded meaningful channel feature evaluation.

[c] Only a single riffle was surveyed for the North Branch reference reach, Wolf Creek Engineering, PLLC, 2008..

Table D.2 Riffle and Pool Morphology Summary for South Hominy Creek (SHC), Dimensional Parameters Only.

Upper South Hominy Mitigation Site. Riffle and Pool Morphology Summary																		
	SHC Bianculli Cross-Section 1 (Riffle)						SHC Bianculli Cross-Section 2 (Riffle)						SHC Bianculli Cross-Section 3 (Pool)					
Dimension and Substrate	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4
Based on fixed baseline bankfull elevation																		
Bankfull Width (ft)	31.2						31.3						25.4					
Floodprone Width (ft)	320.0						288.0						379.0					
Bankfull Cross-sectional Area (ft^2)	74.7						64.8						36.4					
Bankfull Mean Depth (ft)	2.4						2.1						1.4					
Bankfull Max Depth (ft)	3.4						3.2						3.4					
Bankfull Width/Depth Ratio	13.1						15.0						17.8					
Bankfull Entrenchment Ratio	10.2						9.3						14.9					
Bankfull Bank Height Ratio	1.4						1.8						2.0					
Based on current/developing bankfull feature																		
Bankfull Width (ft)																		
Floodprone Width (ft)																		
Bankfull Cross-sectional Area (ft^2)																		
Bankfull Mean Depth (ft)																		
Bankfull Max Depth (ft)																		
Bankfull Width/Depth Ratio																		
Bankfull Entrenchment Ratio																		
Bankfull Bank Height Ratio																		
Cross-sectional Area between end pins (ft^2)																		
D50(mm)	21.2						21.0											
	SHC Bura Cross-Section 1 (Riffle)						SHC Bura Cross-Section 2 (Riffle)						SHC Bura Cross-Section 3 (Pool)					
Dimension and Substrate	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4
Based on fixed baseline bankfull elevation																		
Bankfull Width (ft)	30.9						30.0						34.2					
Floodprone Width (ft)	203.0						315.0						465.0					
Bankfull Cross-sectional Area (ft^2)	50.8						76.3						68.7					
Bankfull Mean Depth (ft)	1.7						2.6						2.0					
Bankfull Max Depth (ft)	2.5						3.6						4.9					
Bankfull Width/Depth Ratio	18.6						11.8						17.0					
Bankfull Entrenchment Ratio	6.6						10.5						13.6					
Bankfull Bank Height Ratio	2.0						1.8						1.3					
Based on current/developing bankfull feature																		
Bankfull Width (ft)																		
Floodprone Width (ft)																		
Bankfull Cross-sectional Area (ft^2)																		
Bankfull Mean Depth (ft)																		
Bankfull Max Depth (ft)																		
Bankfull Width/Depth Ratio																		
Bankfull Entrenchment Ratio																		
Bankfull Bank Height Ratio																		
Cross-sectional Area between end pins (ft^2)																		
D50(mm)	30.0						24.5											

Table D.2 Continued

Upper South Hominy Mitigation Site. Riffle and Pool Morphology Summary																		
	SHC Bura Cross-Section 4 (Riffle)						SHC Bura Cross-Section 5 (Riffle)						SHC Bura Cross-Section 6 (Pool)					
Dimension and Substrate	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4
Based on fixed baseline bankfull elevation																		
Bankfull Width (ft)	37.3						36.3						29.2					
Floodprone Width (ft)	370.0						320.0						316.0					
Bankfull Cross-sectional Area (ft^2)	69.5						81.4						63.5					
Bankfull Mean Depth (ft)	1.9						2.2						2.2					
Bankfull Max Depth (ft)	2.9						3.2						4.3					
Bankfull Width/Depth Ratio	20.1						16.2						13.4					
Bankfull Entrenchment Ratio	9.9						8.8						10.8					
Bankfull Bank Height Ratio	1.2						1.1						1.2					
Based on current/developing bankfull feature																		
Bankfull Width (ft)																		
Floodprone Width (ft)																		
Bankfull Cross-sectional Area (ft^2)																		
Bankfull Mean Depth (ft)																		
Bankfull Max Depth (ft)																		
Bankfull Width/Depth Ratio																		
Bankfull Entrenchment Ratio																		
Bankfull Bank Height Ratio																		
Cross-sectional Area between end pins (ft^2)																		
D50(mm)	35.3						17.3											
	SHC Davis Cross-Section 1 (Riffle)						SHC Davis Cross-Section 2 (Pool)						Cross-Section ()					
Dimension and Substrate	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4
Based on fixed baseline bankfull elevation																		
Bankfull Width (ft)	27.2						26.4											
Floodprone Width (ft)	363.0						586.0											
Bankfull Cross-sectional Area (ft^2)	70.2						86.5											
Bankfull Mean Depth (ft)	2.6						3.3											
Bankfull Max Depth (ft)	3.8						4.9											
Bankfull Width/Depth Ratio	10.5						8.1											
Bankfull Entrenchment Ratio	13.4						22.2											
Bankfull Bank Height Ratio	1.4						1.3											
Based on current/developing bankfull feature																		
Bankfull Width (ft)																		
Floodprone Width (ft)																		
Bankfull Cross-sectional Area (ft^2)																		
Bankfull Mean Depth (ft)																		
Bankfull Max Depth (ft)																		
Bankfull Width/Depth Ratio																		
Bankfull Entrenchment Ratio																		
Bankfull Bank Height Ratio																		
Cross-sectional Area between end pins (ft^2)																		
D50(mm)	39.2																	

Table D.2 Continued

Upper South Hominy Mitigation Site. Riffle and Pool Morphology Summary																		
	Davis UT3 Cross-Section 1 (Riffle)						Davis UT3 Cross-Section 2 (Riffle)						Davis UT3 Cross-Section 3 (Riffle)					
Dimension and Substrate	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4
Based on fixed baseline bankfull elevation																		
Bankfull Width (ft)	10.0						3.9						4.4					
Floodprone Width (ft)	15.3						6.0						14.0					
Bankfull Cross-sectional Area (ft^2)	7.4						4.5						6.5					
Bankfull Mean Depth (ft)	0.7						1.2						1.5					
Bankfull Max Depth (ft)	1.1						1.4						1.8					
Bankfull Width/Depth Ratio	13.8						3.3						3.0					
Bankfull Entrenchment Ratio	1.5						1.6						3.1					
Bankfull Bank Height Ratio	3.6						3.7						3.4					
Based on current/developing bankfull feature																		
Bankfull Width (ft)																		
Floodprone Width (ft)																		
Bankfull Cross-sectional Area (ft^2)																		
Bankfull Mean Depth (ft)																		
Bankfull Max Depth (ft)																		
Bankfull Width/Depth Ratio																		
Bankfull Entrenchment Ratio																		
Bankfull Bank Height Ratio																		
Cross-sectional Area between end pins (ft^2)																		
D50(mm)																		
	Cross-Section ()						Cross-Section ()						Cross-Section ()					
Dimension and Substrate	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4	Exist.	Base	MY1	MY2	MY3	MY4
Based on fixed baseline bankfull elevation																		
Bankfull Width (ft)																		
Floodprone Width (ft)																		
Bankfull Cross-sectional Area (ft^2)																		
Bankfull Mean Depth (ft)																		
Bankfull Max Depth (ft)																		
Bankfull Width/Depth Ratio																		
Bankfull Entrenchment Ratio																		
Bankfull Bank Height Ratio																		
Based on current/developing bankfull feature																		
Bankfull Width (ft)																		
Floodprone Width (ft)																		
Bankfull Cross-sectional Area (ft^2)																		
Bankfull Mean Depth (ft)																		
Bankfull Max Depth (ft)																		
Bankfull Width/Depth Ratio																		
Bankfull Entrenchment Ratio																		
Bankfull Bank Height Ratio																		
Cross-sectional Area between end pins (ft^2)																		
D50(mm)																		

Table D.3 Existing Pattern Data, Upper South Hominy Mitigation Site.

Channel Pattern													
SHC Entire Reach													
Parameter	Measurements							Min	Max	Med	Mean	SD	n
Channel Belt Width	97.4	43.6	79.8	46.3	28.2	45.6		28.2	97.4	46.0	56.8	26.1	6
Radius of Curvature	29.7	465.2	428.2	146.4	160.3	545.1		29.7	545.1	294.3	295.8	209.7	6
Meander Wavelength	295.4	343.5	561.5	182.0	140.0	319.5		140.0	561.5	307.5	307.0	148.3	6
Radius of Curvature:WidthBKF	0.9	14.5	13.4	4.6	5.0	17.0		0.9	17.0	9.2	9.2	6.6	6
Meander Width Ratio	3.0	1.4	2.5	1.4	0.9	1.4		0.9	3.0	1.4	1.8	0.8	6

Channel Pattern													
SHC Bianculli Reach													
Parameter	Measurements							Min	Max	Med	Mean	SD	n
Channel Belt Width	78.1	97.4	43.6	90.2				43.6	97.4	84.2	77.3	23.9	4
Radius of Curvature	295.4	237.3	343.5					237.3	343.5	295.4	292.1	53.2	3
Meander Wavelength	91.0	29.7	240.3	465.2				29.7	465.2	165.7	206.6	193.8	4
Radius of Curvature:WidthBKF	9.5	7.6	11.0					7.6	11.0	9.5	9.4	1.7	3
Meander Width Ratio	2.5	3.1	1.4	2.9				1.4	3.1	2.7	2.5	0.8	4

Channel Pattern													
SHC Roberson and Bura Reach													
Parameter	Measurements							Min	Max	Med	Mean	SD	n
Channel Belt Width	78.7	79.8	46.3	70.5				46.3	79.8	74.6	68.8	15.6	4
Radius of Curvature	211.5	561.5	385.3	182.0	300.7			182.0	561.5	300.7	328.2	152.8	5
Meander Wavelength	231.0	428.2	389.3	157.2	146.4	175.0		146.4	428.2	203.0	254.5	123.6	6
Radius of Curvature:WidthBKF	6.3	16.7	11.5	5.4	8.9			5.4	16.7	8.9	9.8	4.5	5
Meander Width Ratio	2.3	2.4	1.4	2.1				1.4	2.4	2.2	2.0	0.5	4

Channel Pattern													
SHC Davis Reach													
Parameter	Measurements							Min	Max	Med	Mean	SD	n
Channel Belt Width	31.4	33.8	28.2	45.6				28.2	45.6	32.6	34.8	7.6	4
Radius of Curvature	140.0	137.5	177.1	225.2	319.5			137.5	319.5	177.1	199.9	75.7	5
Meander Wavelength	183.7	160.3	403.3	207.5	545.1			160.3	545.1	207.5	300.0	167.6	5
Radius of Curvature:WidthBKF	5.2	5.1	6.5	8.3	11.8			5.1	11.8	6.5	7.4	2.8	5
Meander Width Ratio	1.2	1.2	1.0	1.7				1.0	1.7	1.2	1.3	0.3	4

Table D.3 Continued

Channel Pattern Davis UT3													
Parameter	Measurements							Min	Max	Med	Mean	SD	n
Channel Belt Width	38.9	23.8	11.4	39.5	39.5	13.2	6.8	6.8	39.5	23.8	24.7	14.5	7
Radius of Curvature	125.1	146.8	98.8	58.1	48.6	45.5	81.6	45.5	146.8	81.6	86.4	39.2	7
Meander Wavelength	37.6	180.3	8.5	16.7	32.5	44.5	49.8	8.5	180.3	37.6	52.8	58.1	7
Radius of Curvature:WidthBKF	14.8	17.4	11.7	6.9	5.8	5.4	9.7	5.4	17.4	9.7	10.2	4.7	7
Meander Width Ratio	4.6	2.8	1.4	4.7	4.7	1.6	0.8	0.8	4.7	2.8	2.9	1.7	7

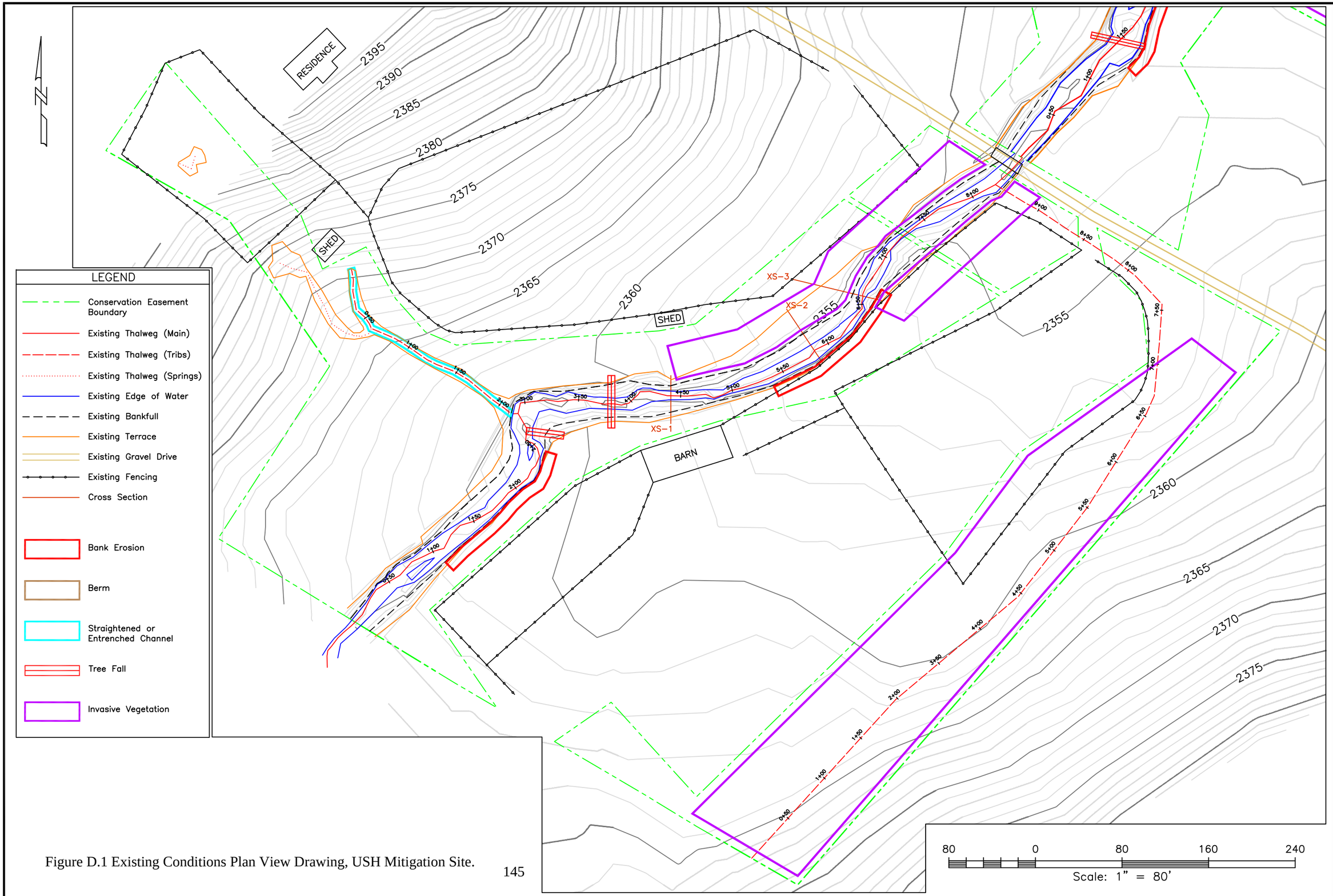


Figure D.1 Existing Conditions Plan View Drawing, USH Mitigation Site.

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EXISTING CONDITIONS
LOAR SECTION

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

Project No. 92632

Date: 18-MAY-10

File Name: ush base.dwg

Surveyed: JCF,CSL,ABB
Designed: CSL,JCF,SLD
Drawn: JCF
Approved: SLD

Sheet No. 1 of 4

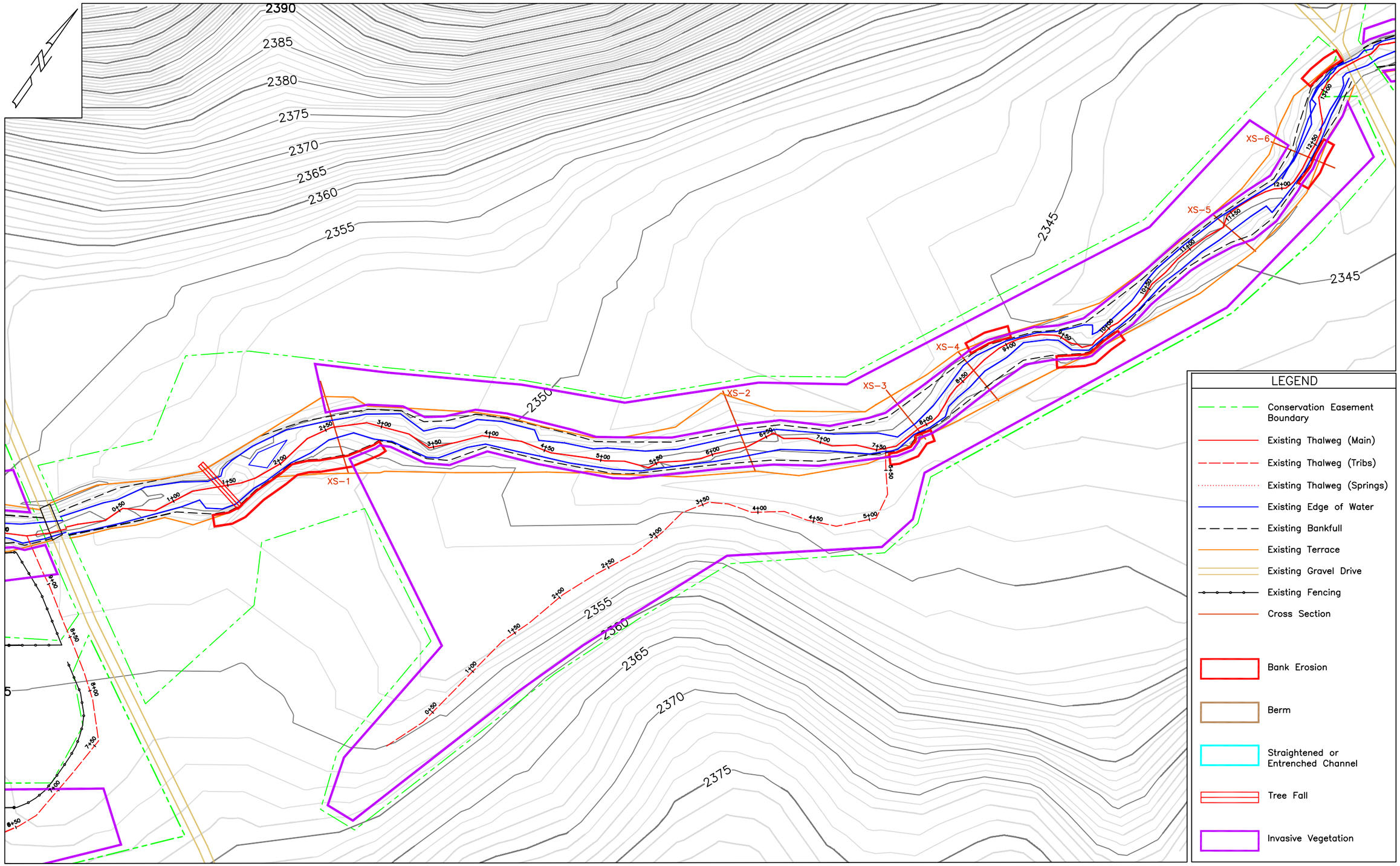


Figure D.1 Continued

80 0 80 160 240

Scale: 1" = 80'

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EXISTING CONDITIONS
BURA/ROBERSON SITE

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

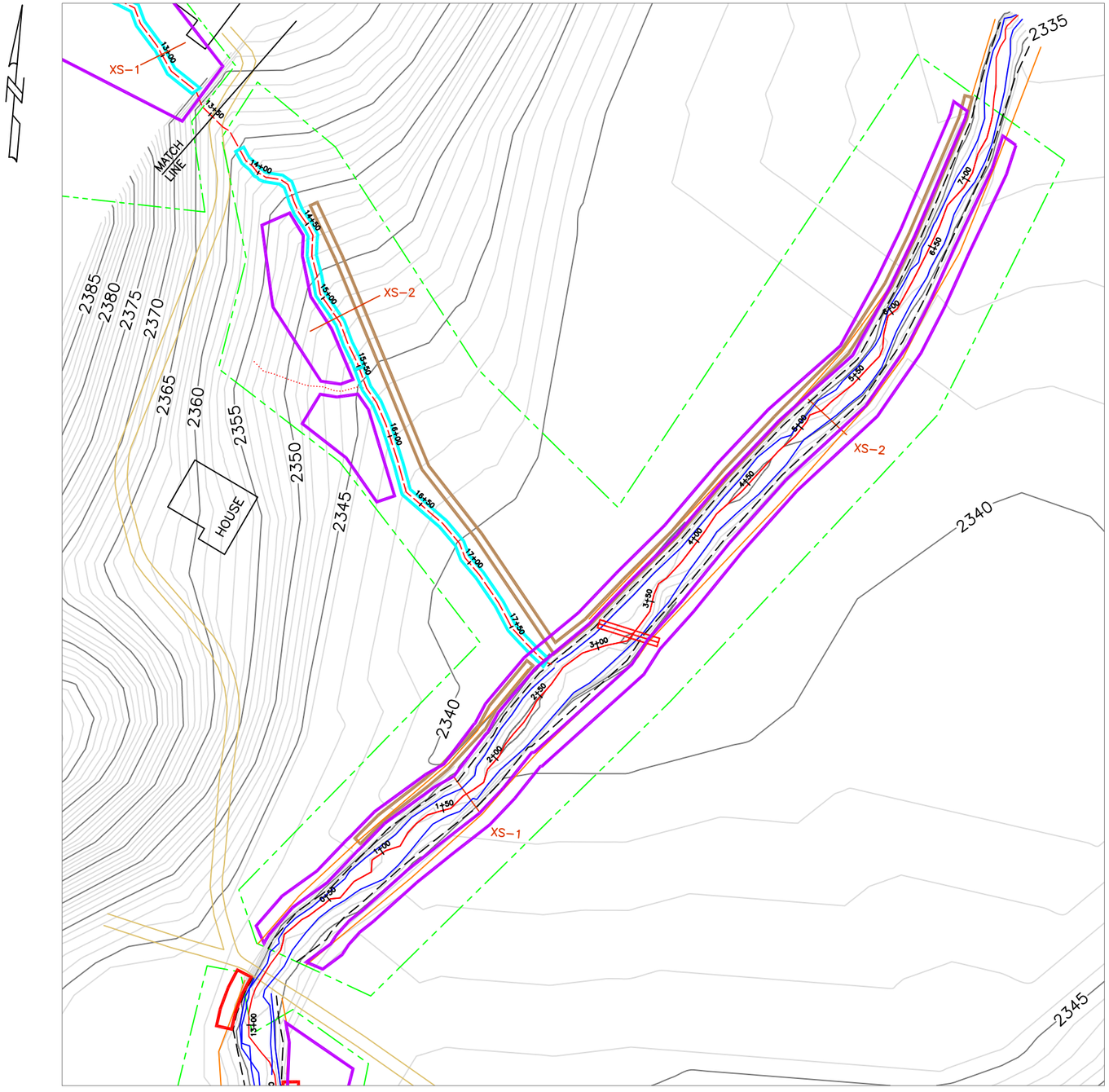
Project No.
92632

Date:
18-MAY-10

File Name:
ush base.dwg

Surveyed: JCF,CSL,ABB
Designed: CSL,JCF,SLD
Drawn: JCF
Approved: SLD

Sheet No.
2 of 4



LEGEND

- Conservation Easement Boundary
- Existing Thalweg (Main)
- Existing Thalweg (Tribs)
- Existing Thalweg (Springs)
- Existing Edge of Water
- Existing Bankfull
- Existing Terrace
- Existing Gravel Drive
- Existing Fencing
- Cross Section
- Bank Erosion
- Berm
- Straightened or Entrenched Channel
- Tree Fall
- Invasive Vegetation

Scale: 1" = 80'

Figure D.1 Continued

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
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www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EXISTING CONDITIONS
DAVIS SECTION (LOWER)

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

Project No. 92632
Date: 18-MAY-10
File Name: ush base.dwg
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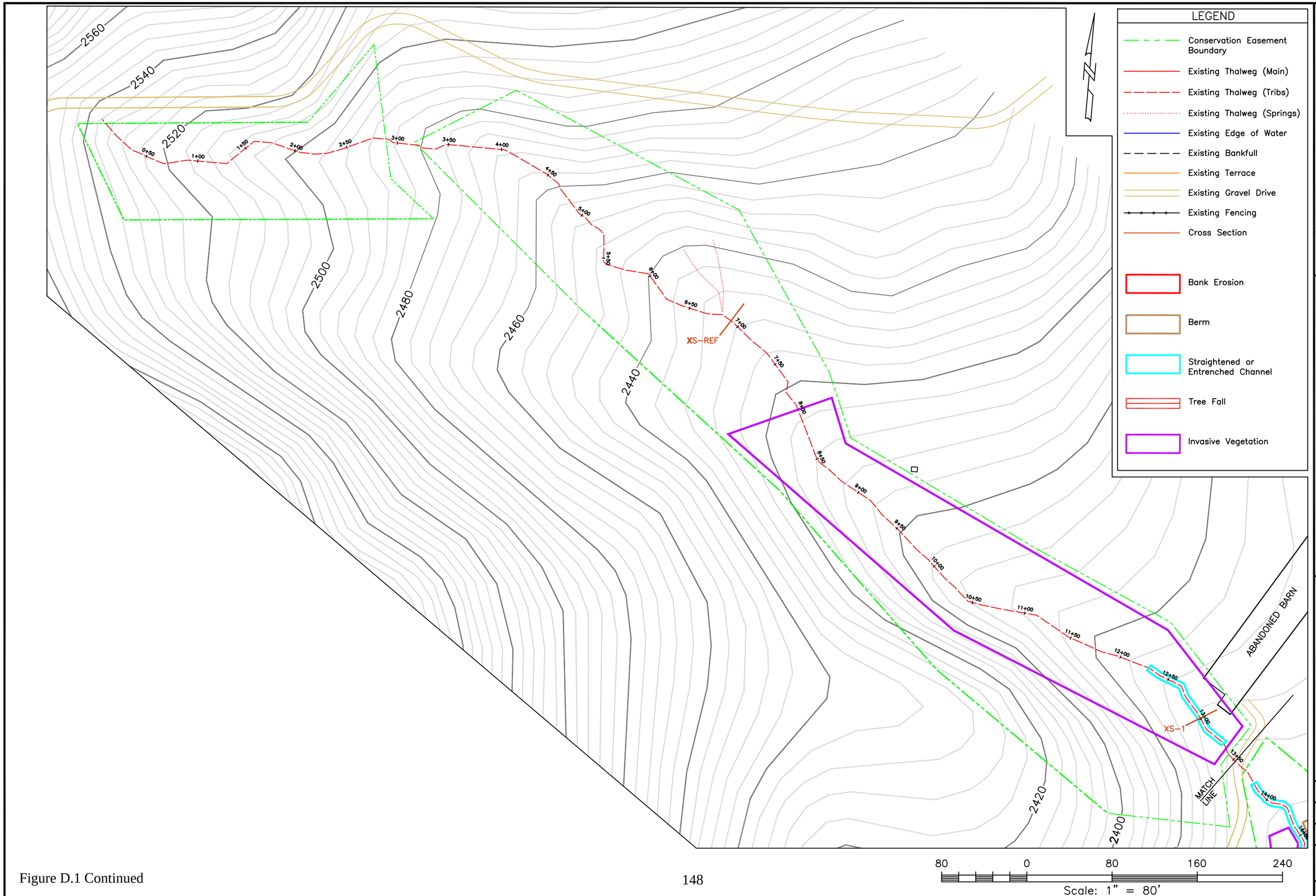
Designed: CSL,JCF,SLD
Drawn: JCF
Approved: SLD
Sheet No. 3 of 4



North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
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www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EXISTING CONDITIONS
DAVIS SECTION (UPPER)

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
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Project No.
92632

Date:
18-MAY-10

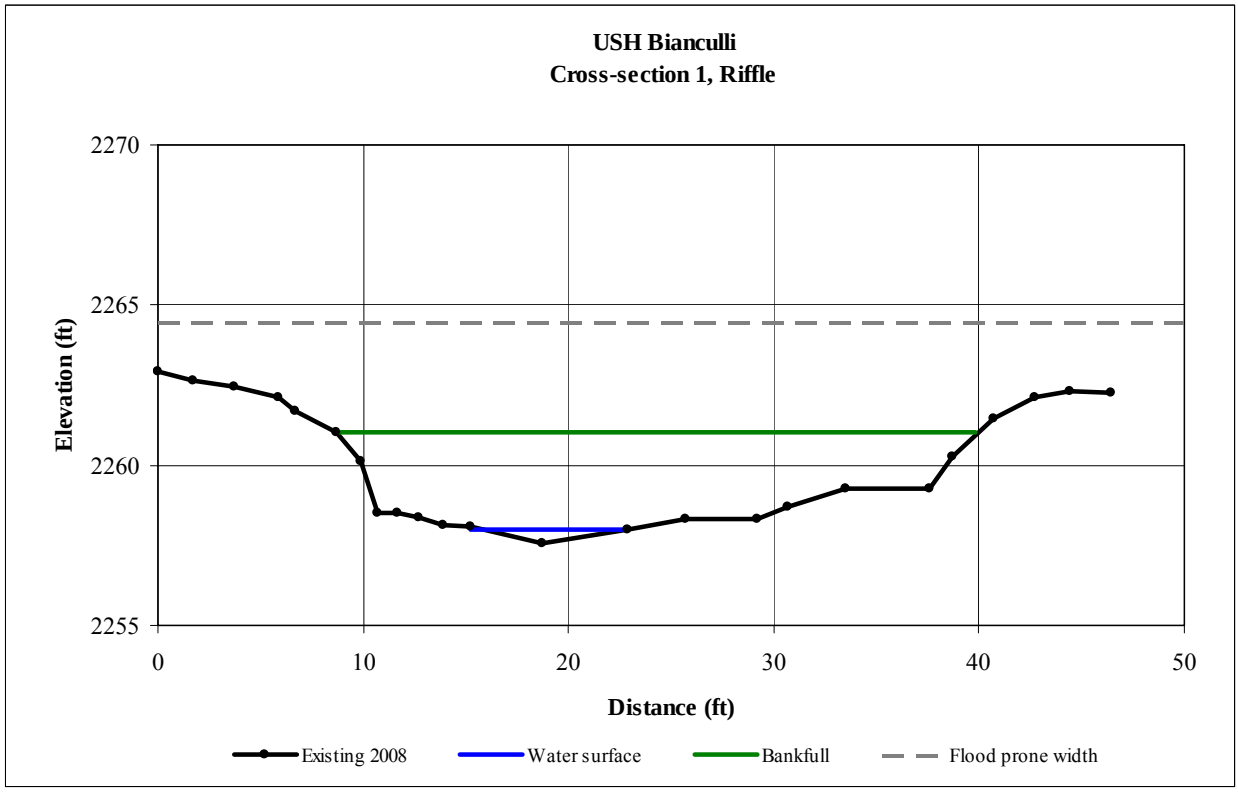
File Name:
ush base.dwg

Surveyed: JCF,CSL,ABB
Designed: CSL,JCF,SLD
Drawn: JCF
Approved:SLD

Sheet No.
4 of 4

Figure D.1 Continued

Figure D.2 Existing Cross-Section Plots, Upper South Hominy Mitigation Site.



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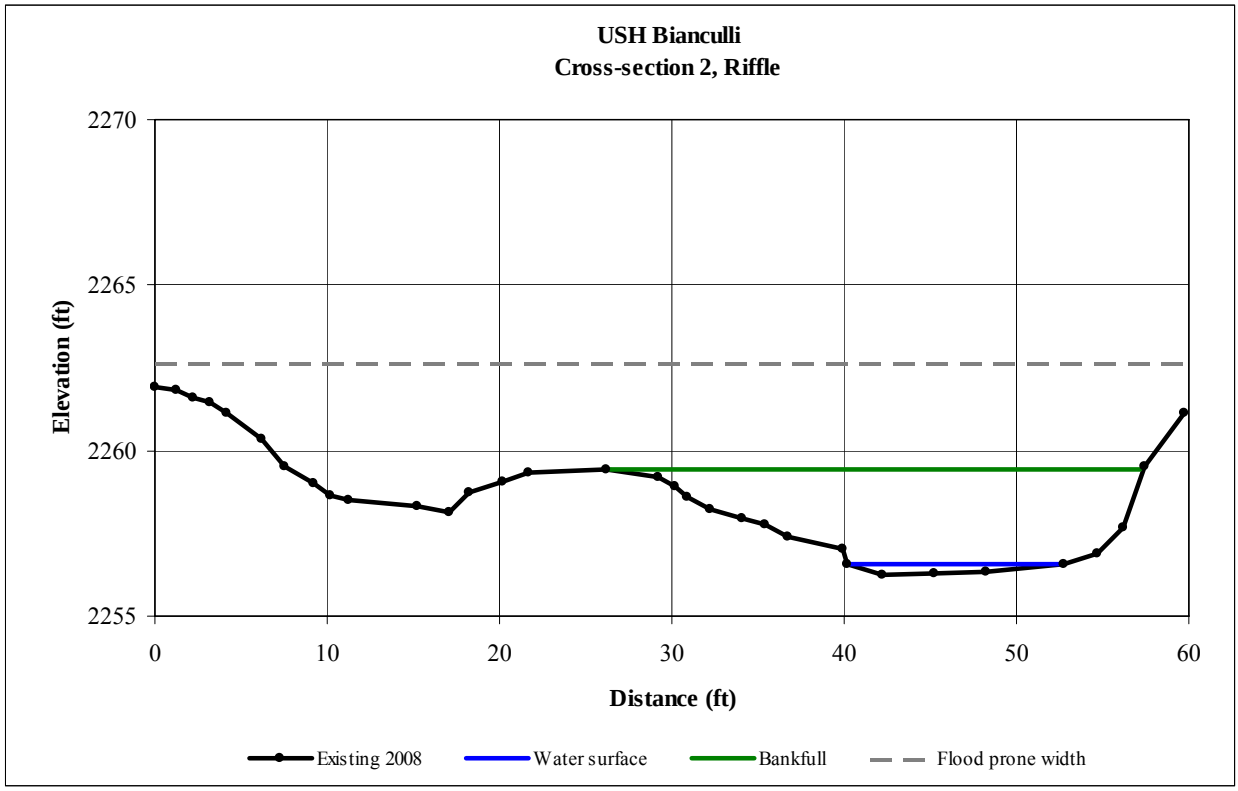

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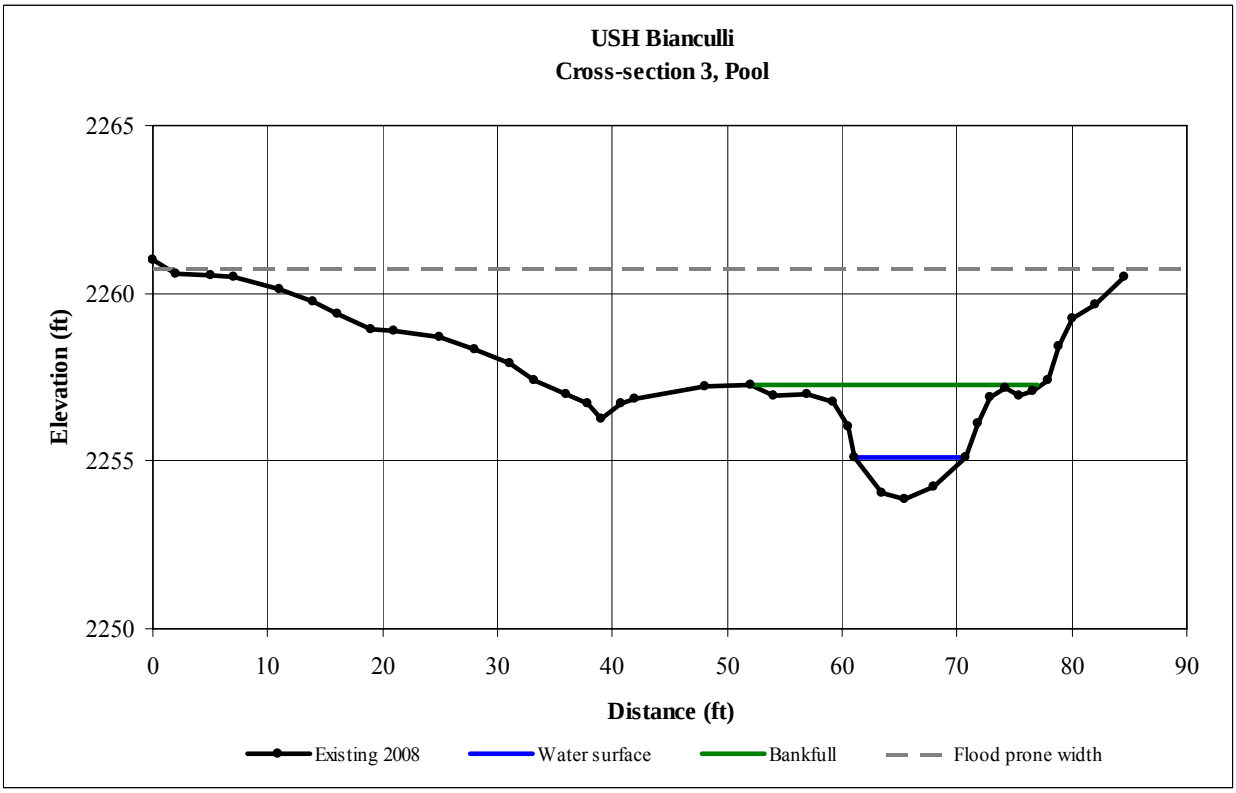

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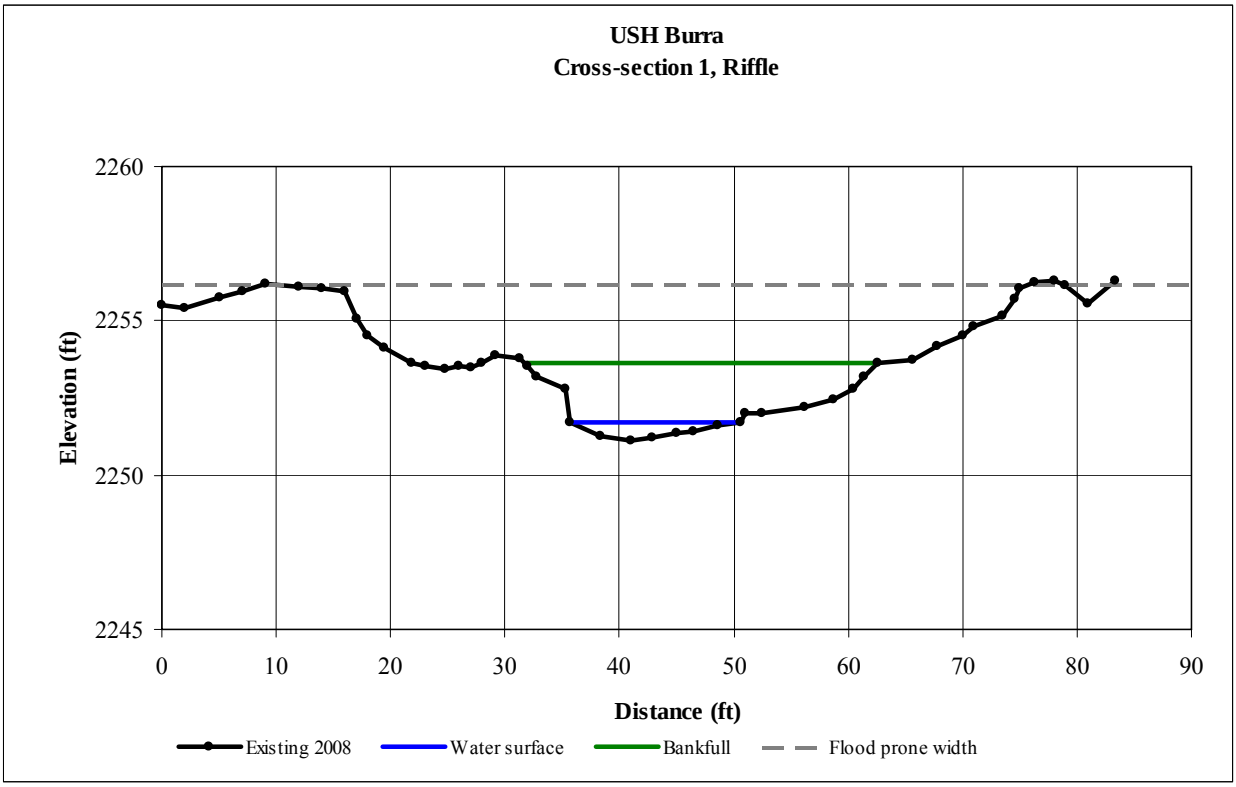

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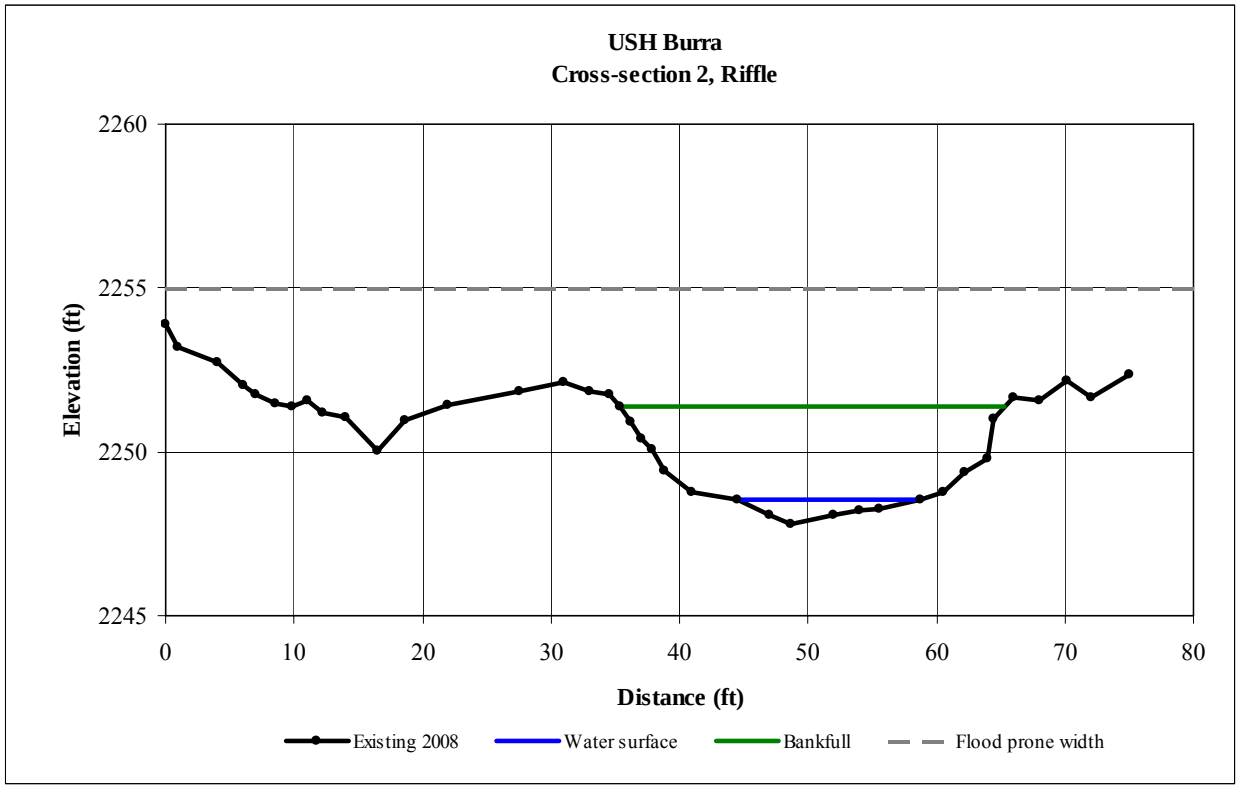

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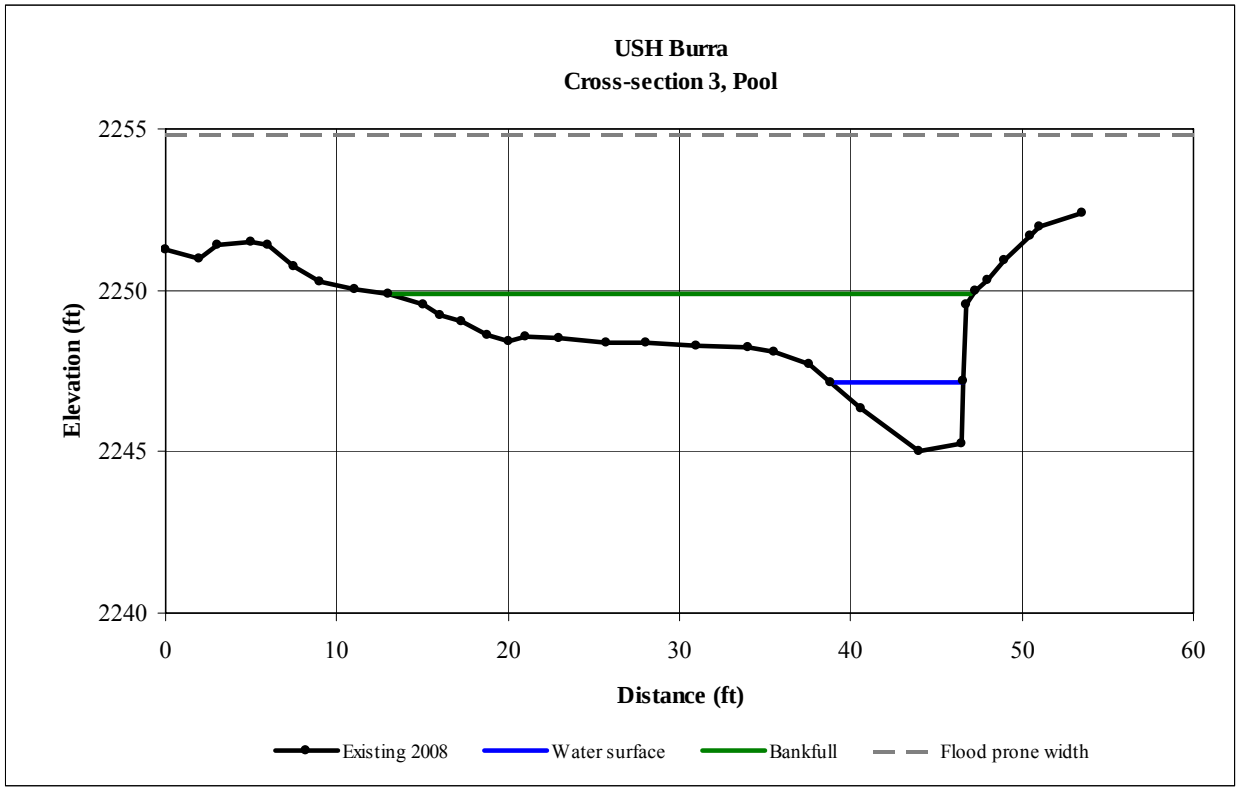

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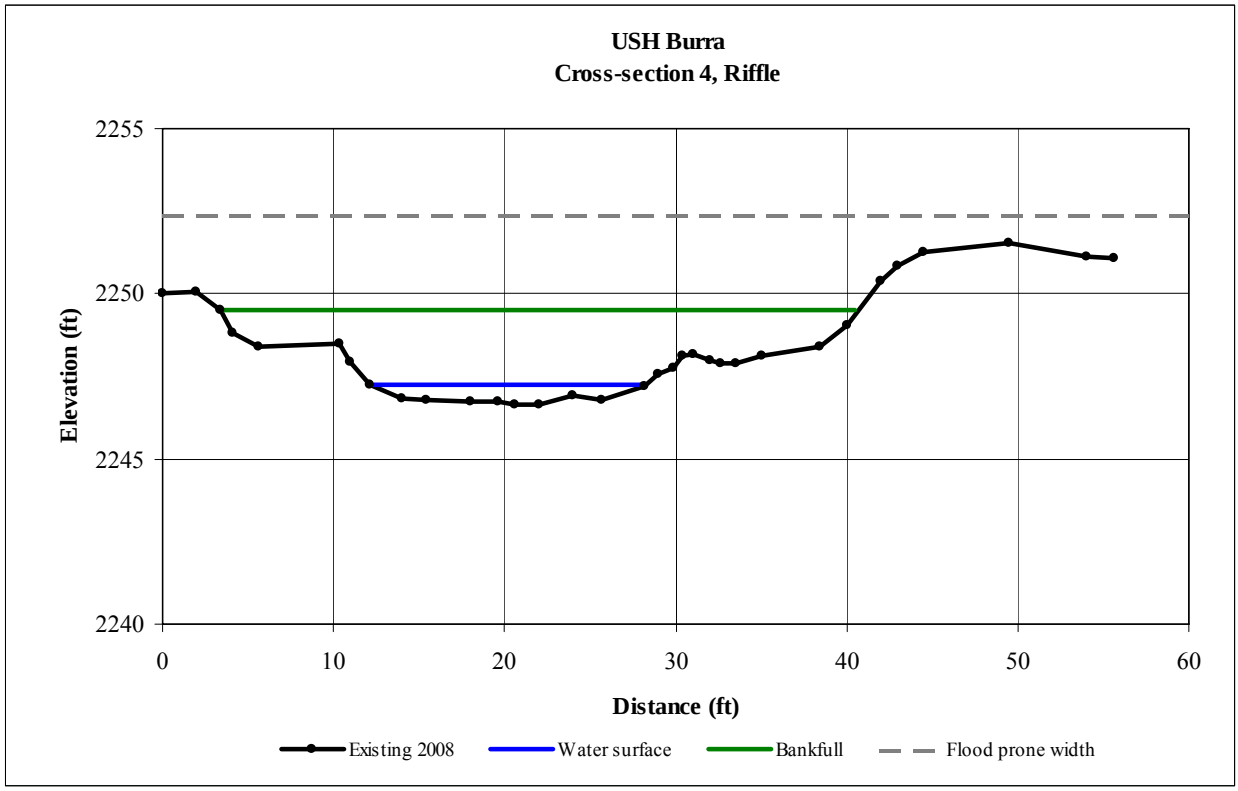
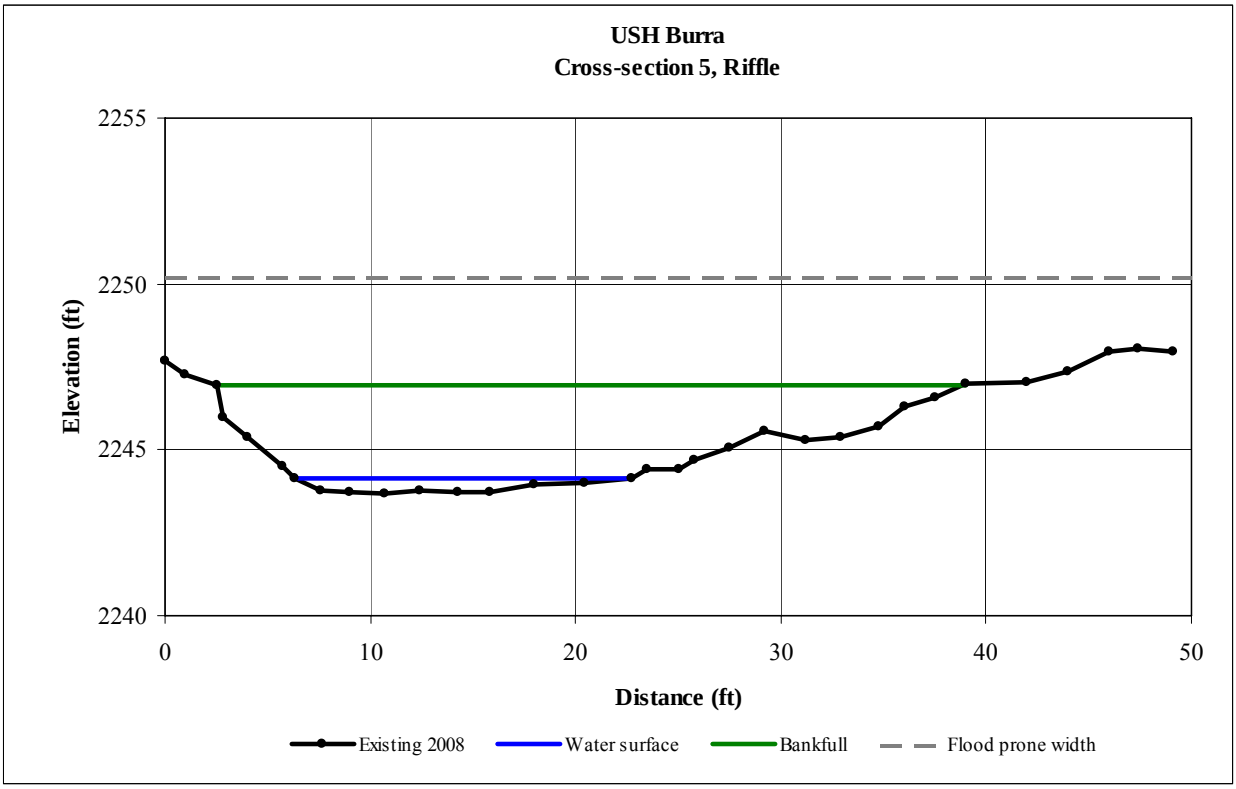


Figure D.2 Continued.



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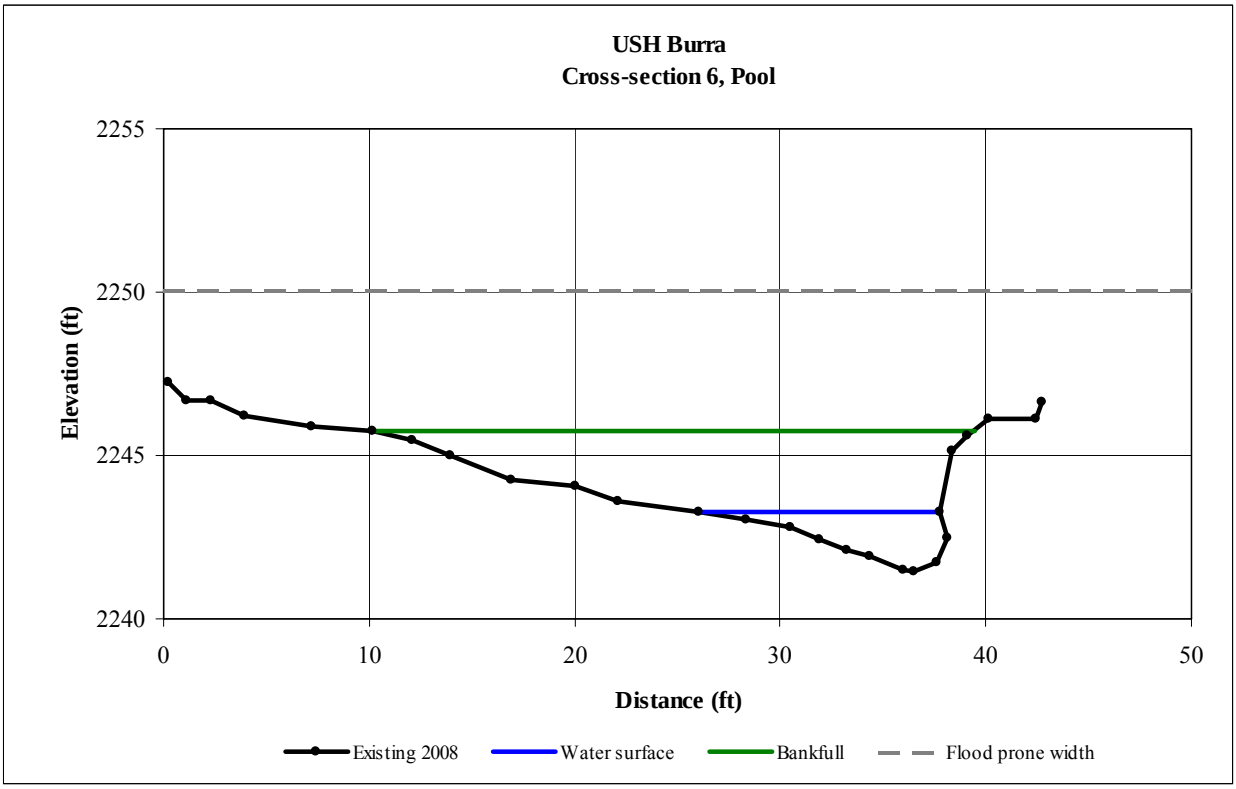
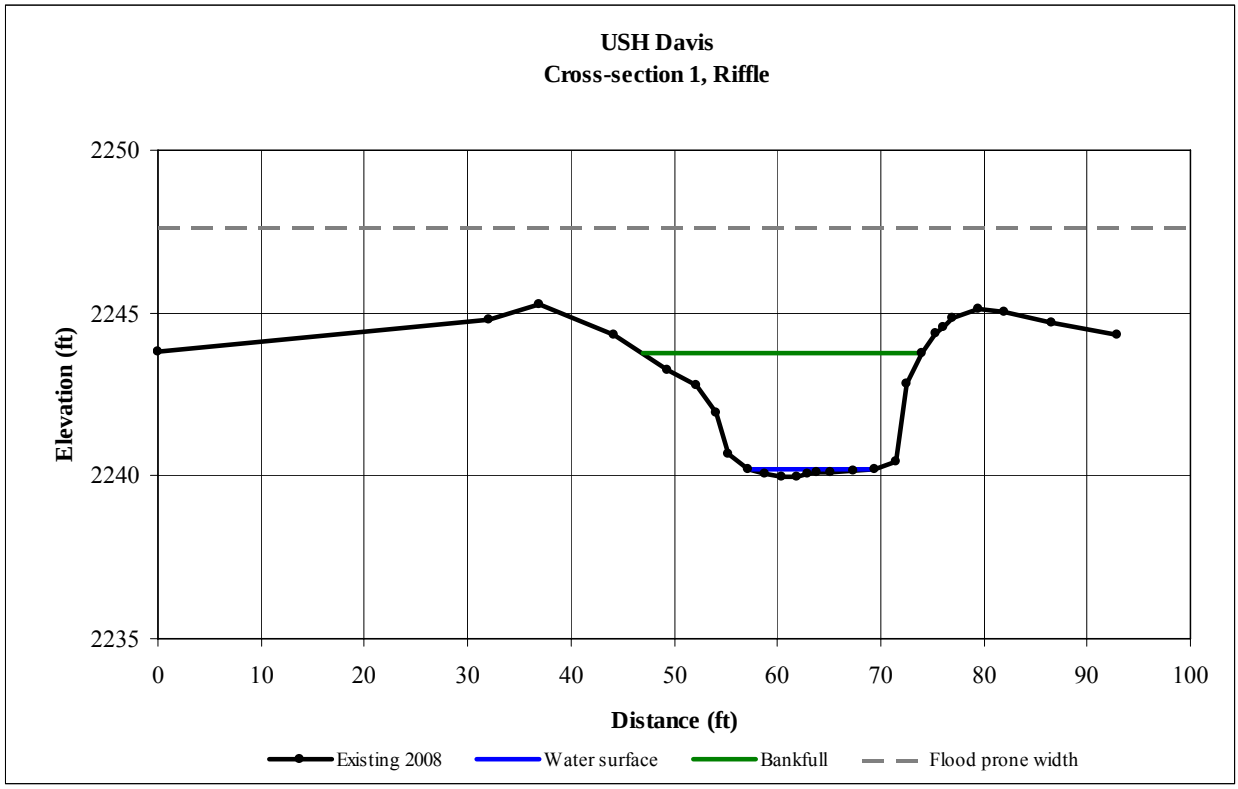


Figure D.2 Continued.



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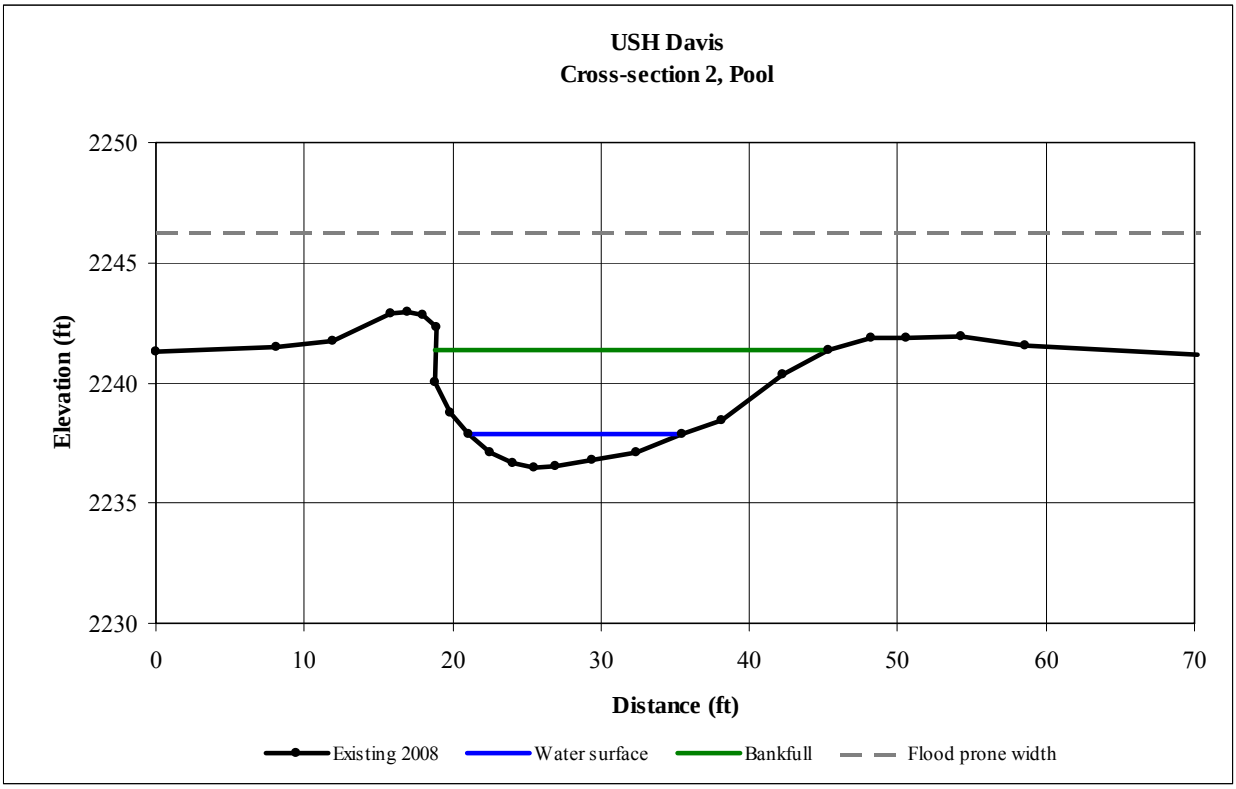


Figure D.2 Continued.

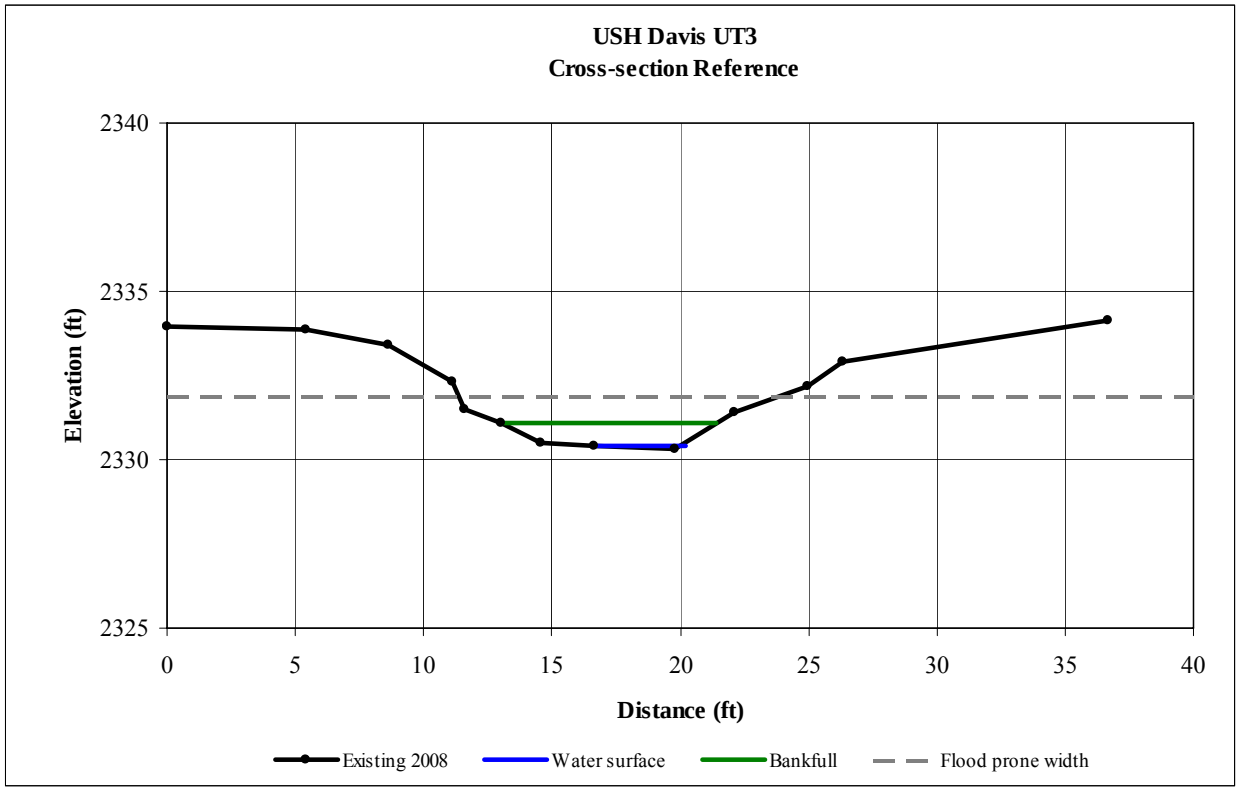


Figure D.2 Continued.

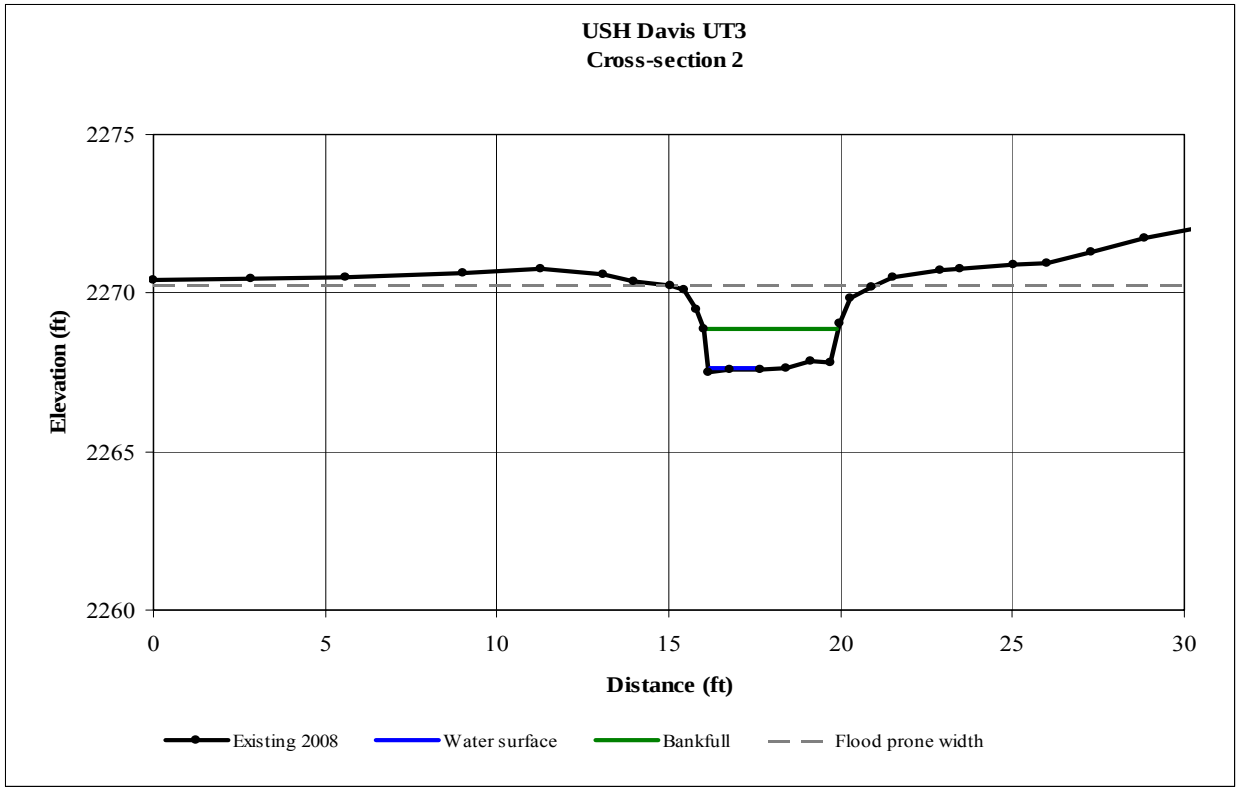


Figure D.2 Continued.

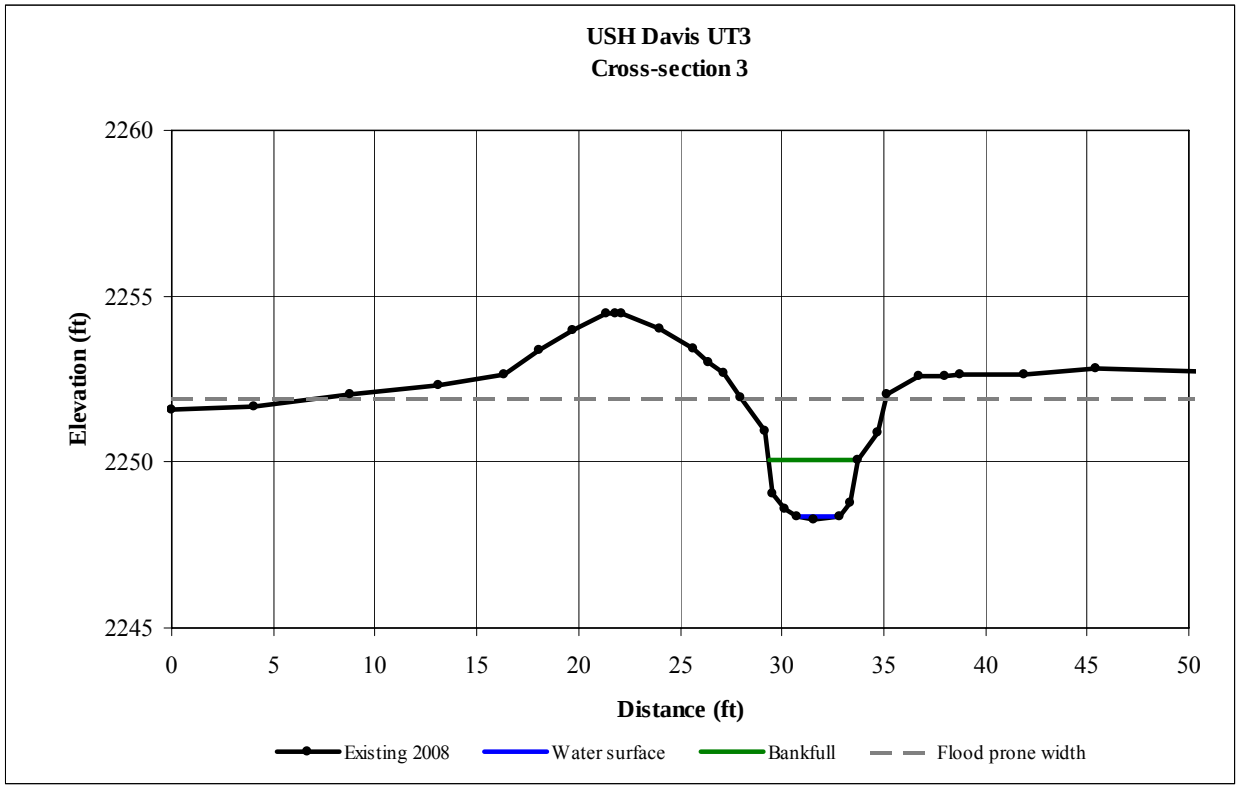


Figure D.3 Existing Longitudinal Profile Data, Upper South Hominy Mitigation Site.

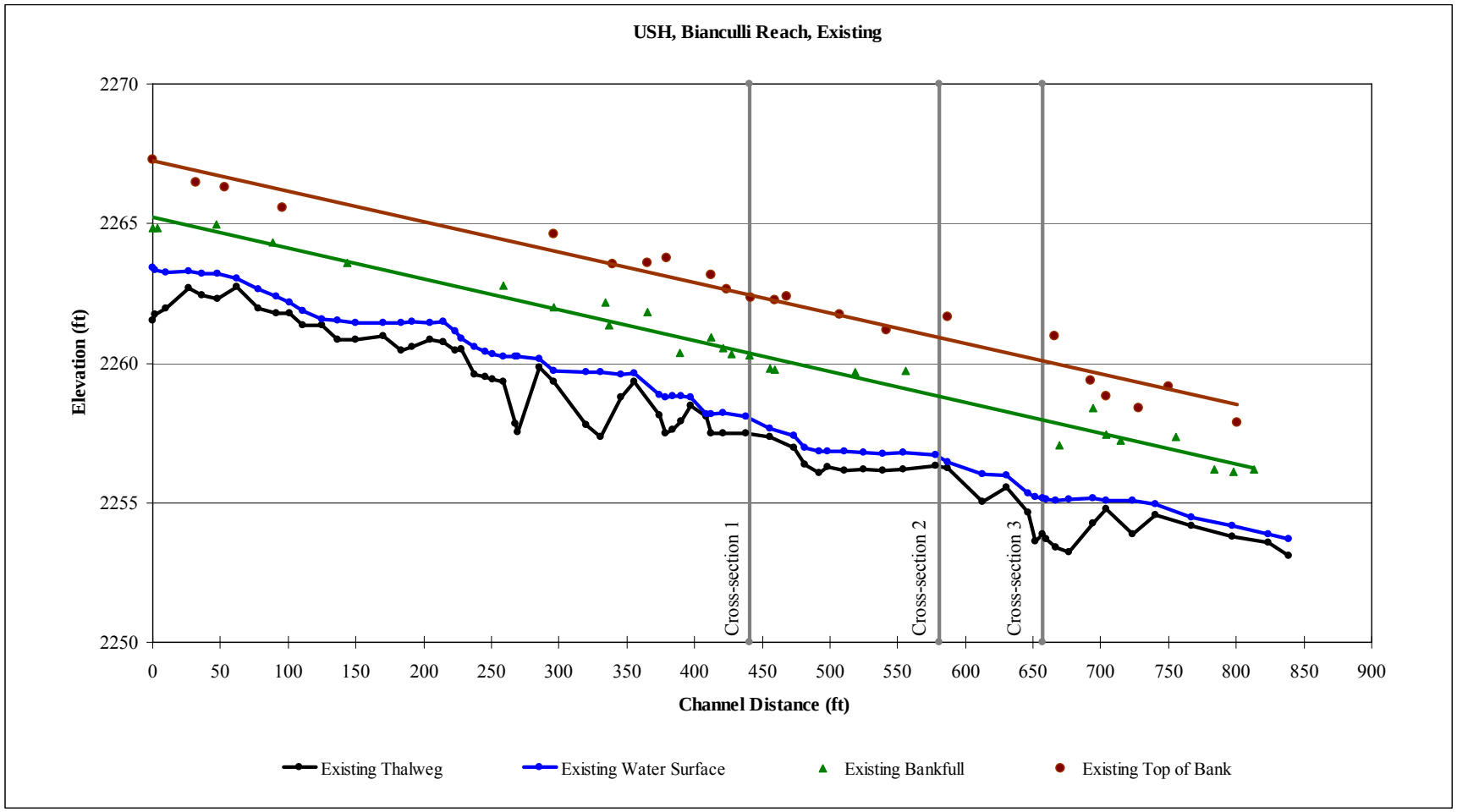


Figure D.3 Continued

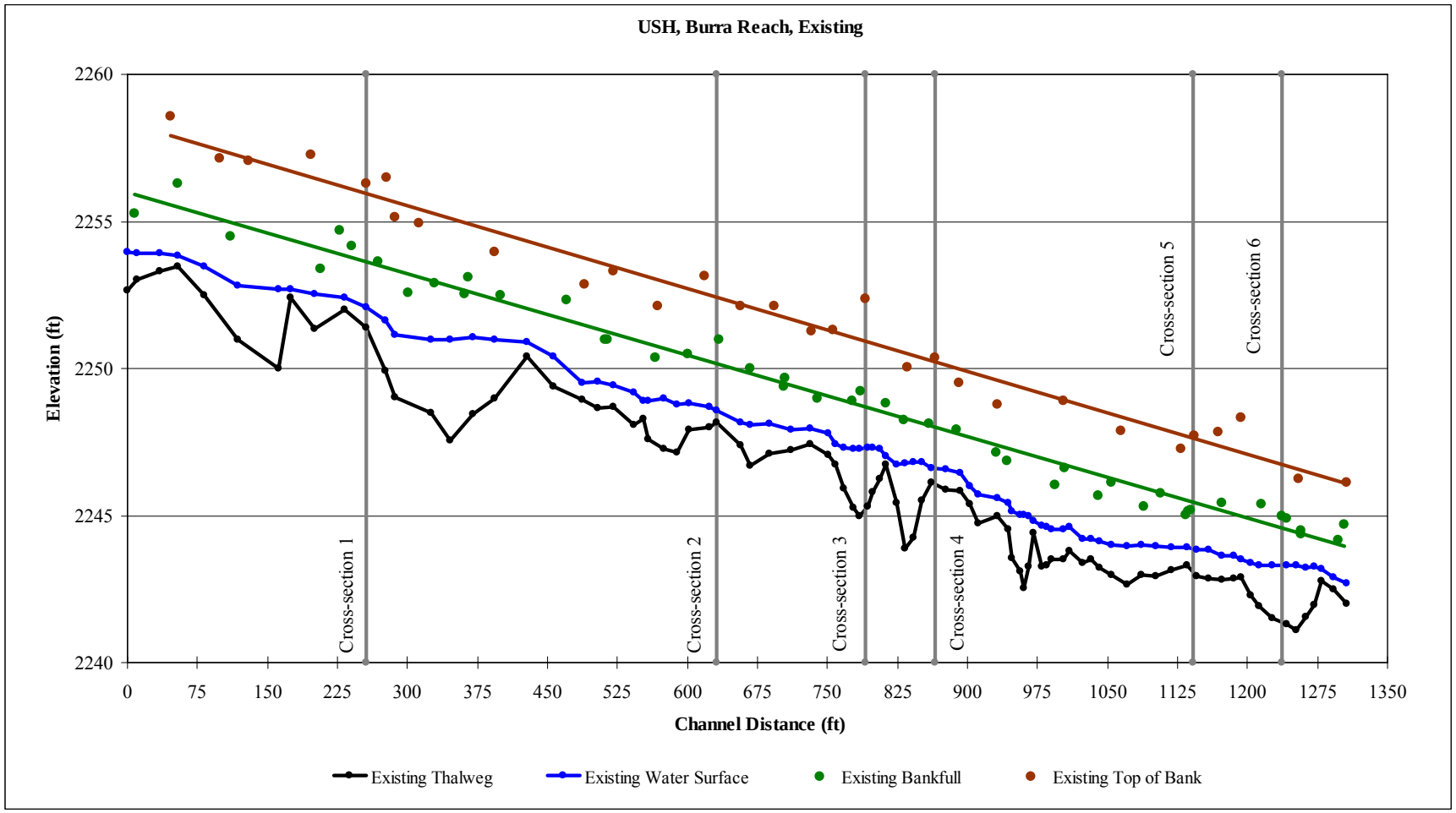


Figure D.3 Continued

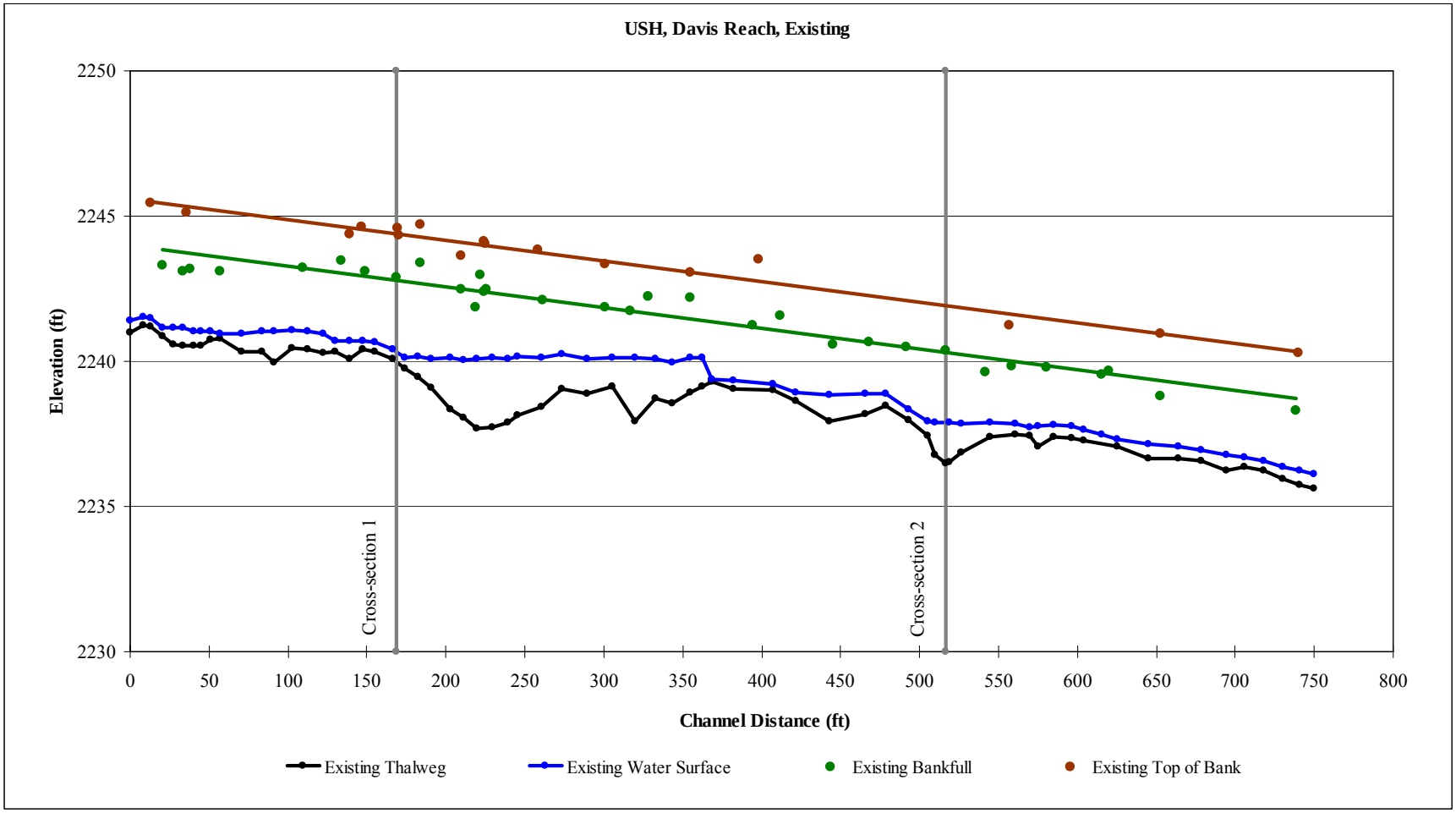


Figure D.3 Continued

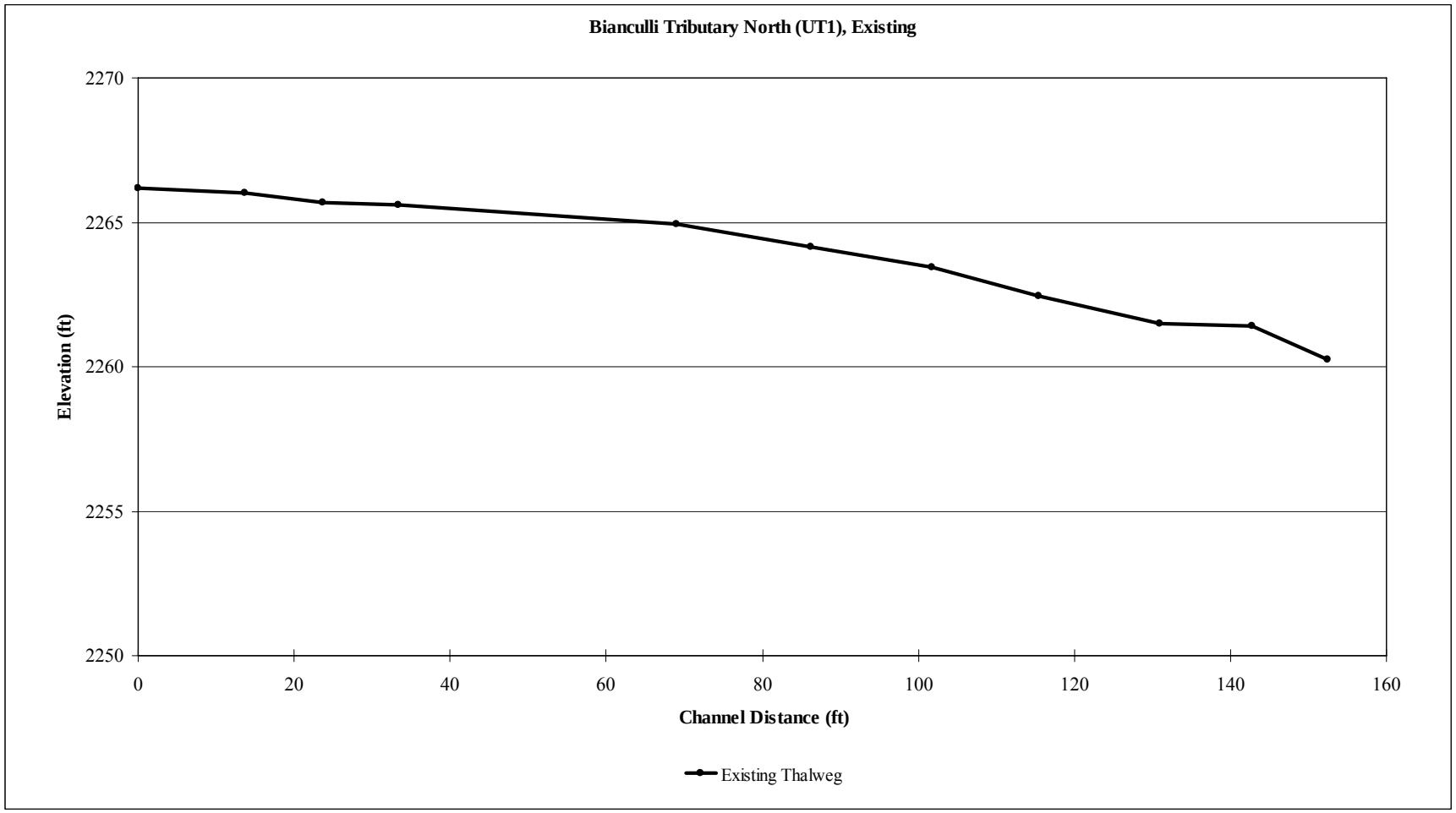


Figure D.3 Continued

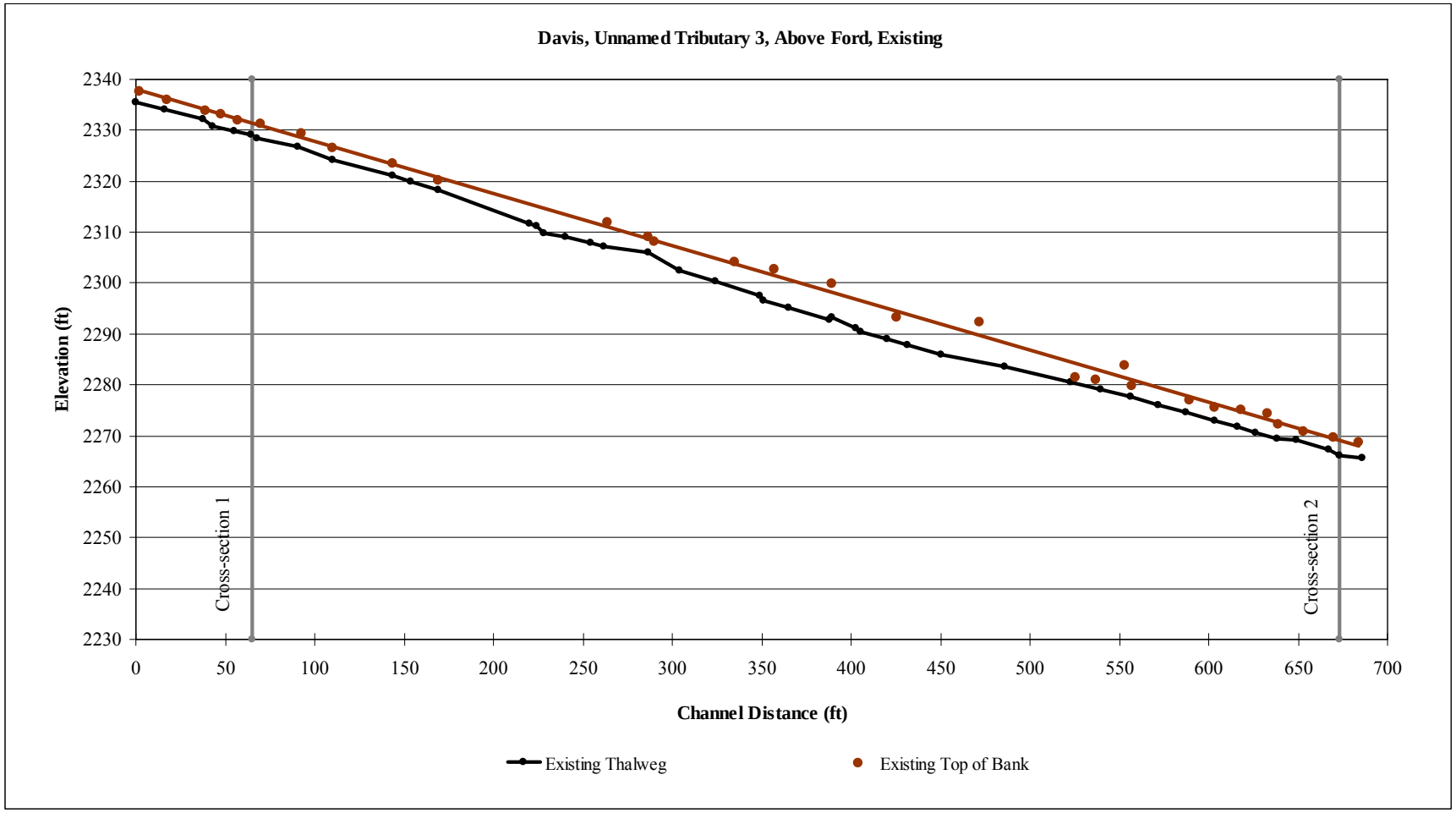


Figure D.3 Continued

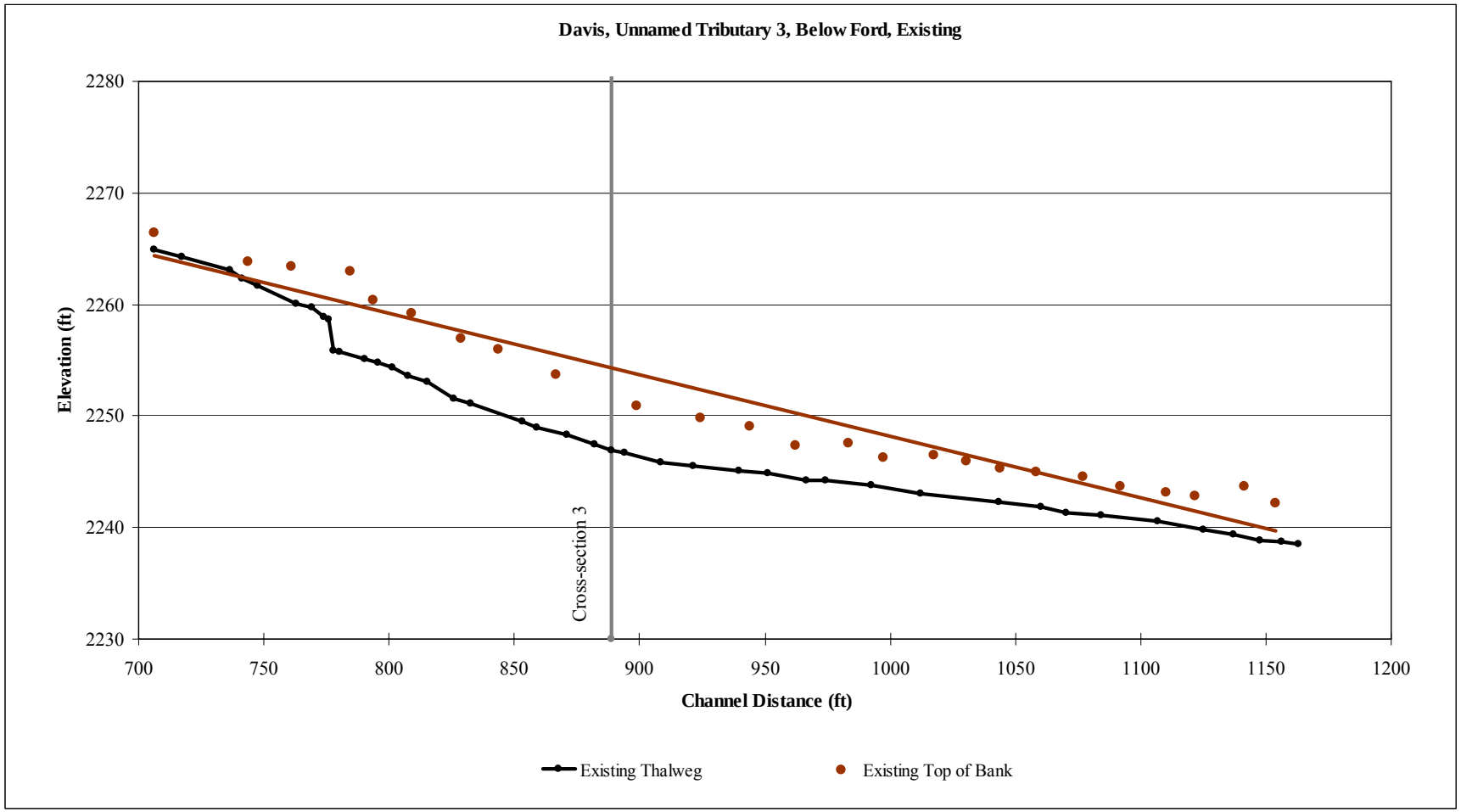
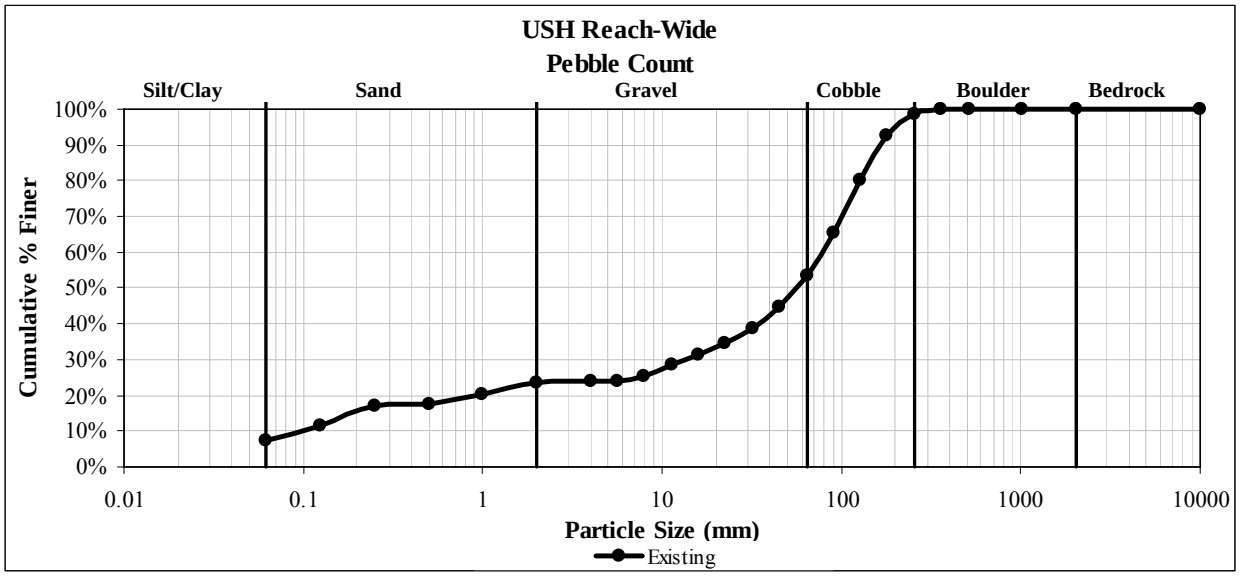
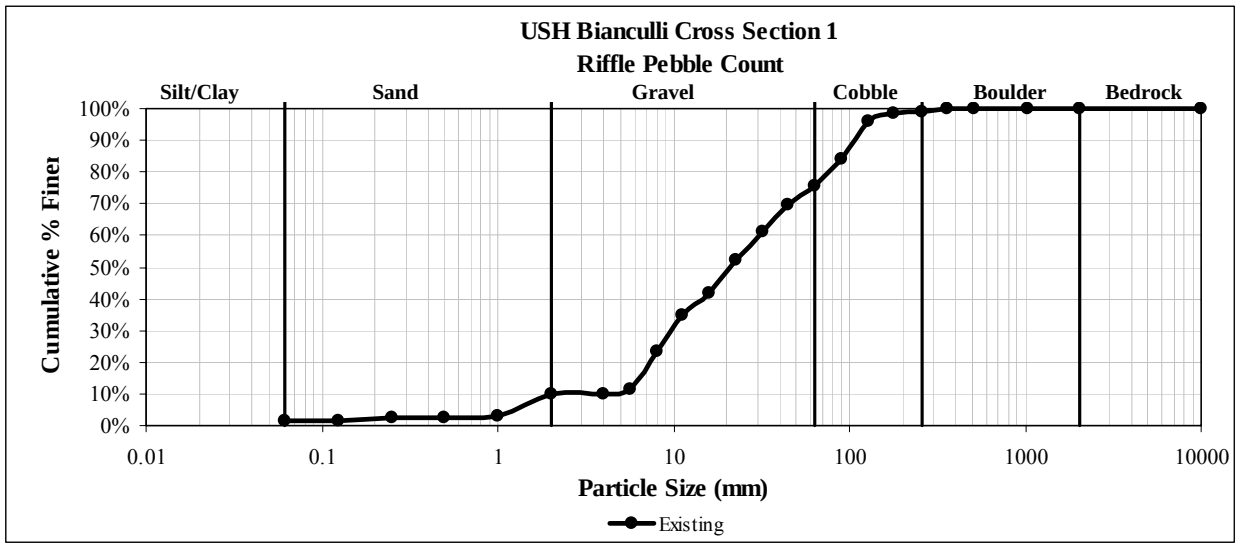


Figure D.4 Existing Pebble Count Cumulative Frequency Distribution Plots, Particle Sizes by Category, and Percent Bed Material by Category.



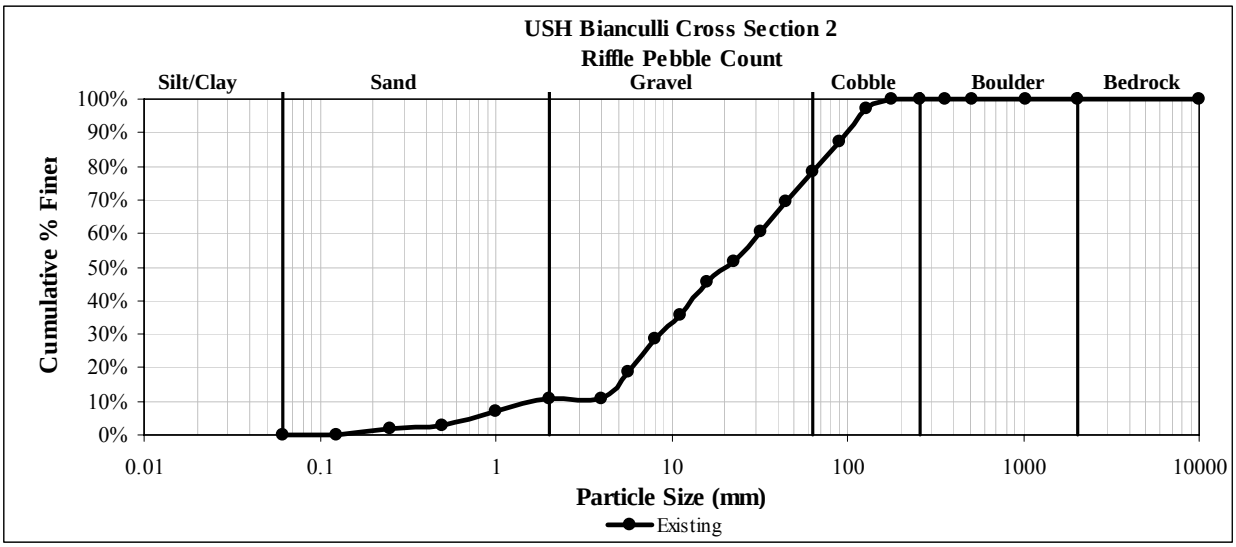
USH Reach-Wide Pebble Count			
	Particle Size by Category		
Category	Existing	MY0	MY1
D16 (mm)	0.2		
D35 (mm)	23.9		
D50 (mm)	56.6		
D84 (mm)	144.4		
D95 (mm)	211.0		
	Percent Bed Material by Category		
Category	Existing	MY0	MY1
Silt/Clay	8.0		
Sand	16.0		
Gravel	30.0		
Cobble	45.0		
Boulder	1.0		
Bedrock	0.0		

Figure D.4 Continued



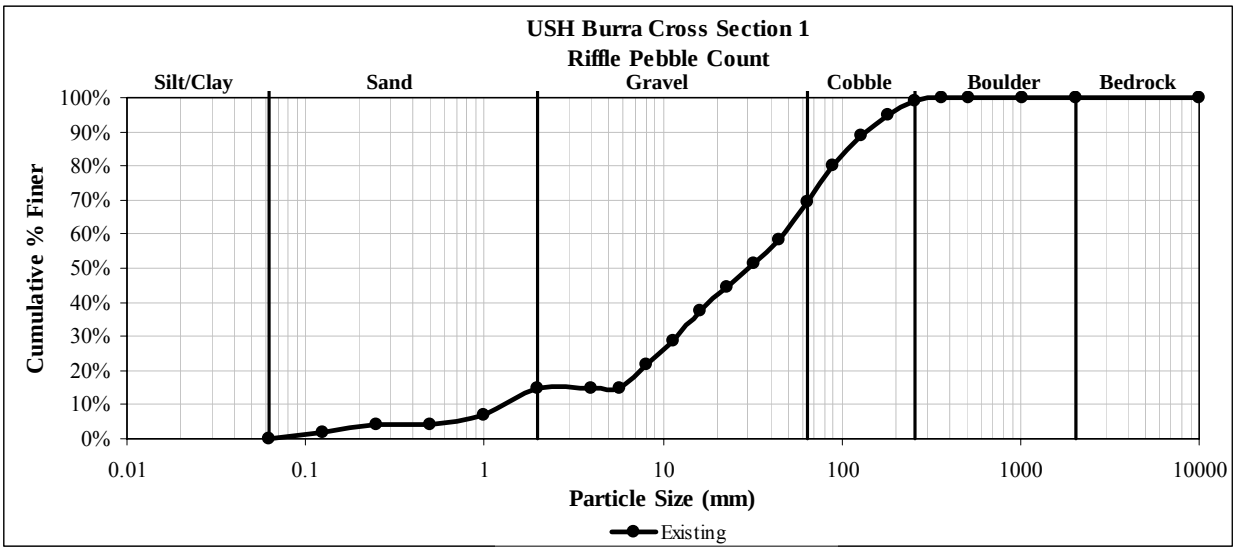
USH Bianculli Cross Section 1 Riffle Pebble Count			
	Particle Size by Category		
Category	Existing	MY0	MY1
D16 (mm)	6.6		
D35 (mm)	11.4		
D50 (mm)	21.2		
D84 (mm)	89.7		
D95 (mm)	124.2		
	Percent Bed Material by Category		
Category	Existing	MY0	MY1
Silt/Clay	2.0		
Sand	8.0		
Gravel	66.0		
Cobble	23.0		
Boulder	1.0		
Bedrock	0.0		

Figure D.4 Continued



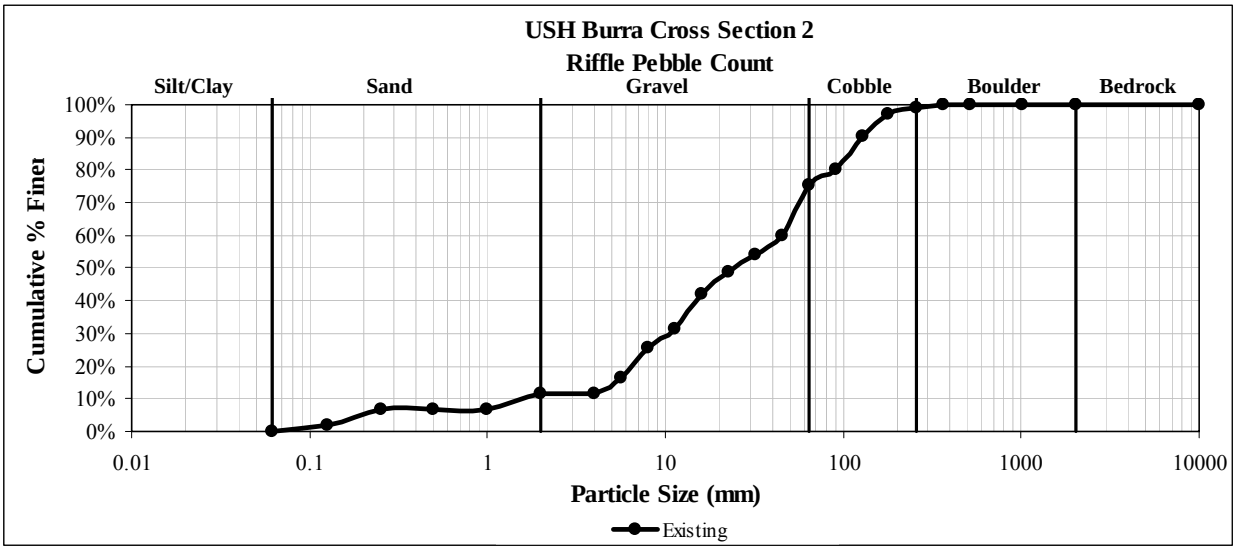
USH Bianculli Cross Section 2 Riffle Pebble Count			
	Particle Size by Category		
Category	Existing	MY0	MY1
D16 (mm)	5.1		
D35 (mm)	11.0		
D50 (mm)	21.0		
D84 (mm)	80.9		
D95 (mm)	120.2		
	Percent Bed Material by Category		
Category	Existing	MY0	MY1
Silt/Clay	0.0		
Sand	11.0		
Gravel	67.0		
Cobble	22.0		
Boulder	0.0		
Bedrock	0.0		

Figure D.4 Continued



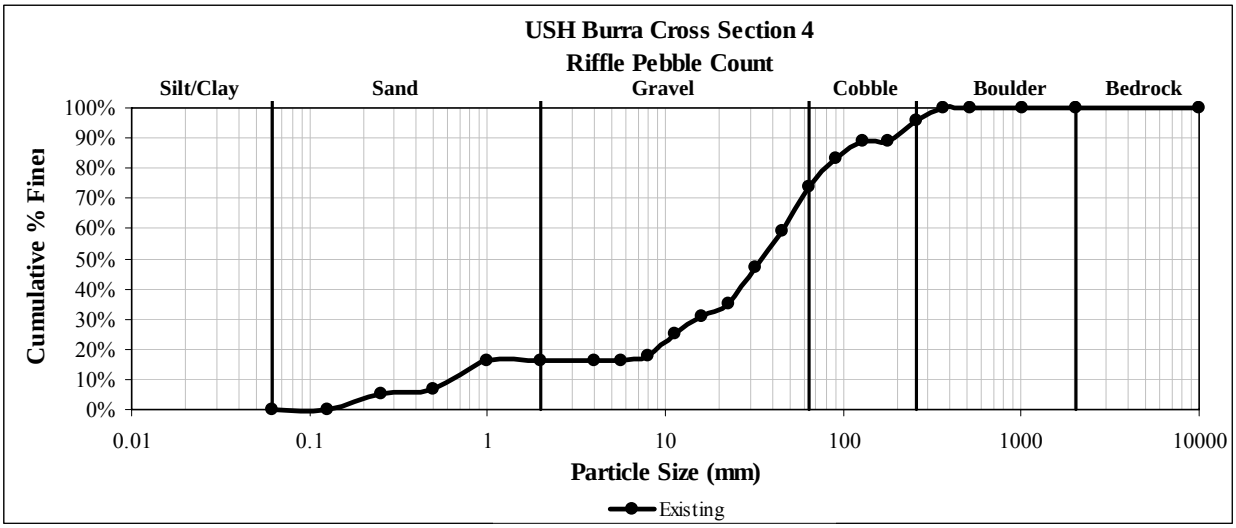
USH Bura Cross Section 1 Riffle Pebble Count			
	Particle Size by Category		
Category	Existing	MY0	MY1
D16 (mm)	6.1		
D35 (mm)	14.6		
D50 (mm)	30.0		
D84 (mm)	106.2		
D95 (mm)	179.6		
	Percent Bed Material by Category		
Category	Existing	MY0	MY1
Silt/Clay	0.0		
Sand	15.0		
Gravel	55.0		
Cobble	30.0		
Boulder	1.0		
Bedrock	0.0		

Figure D.4 Continued



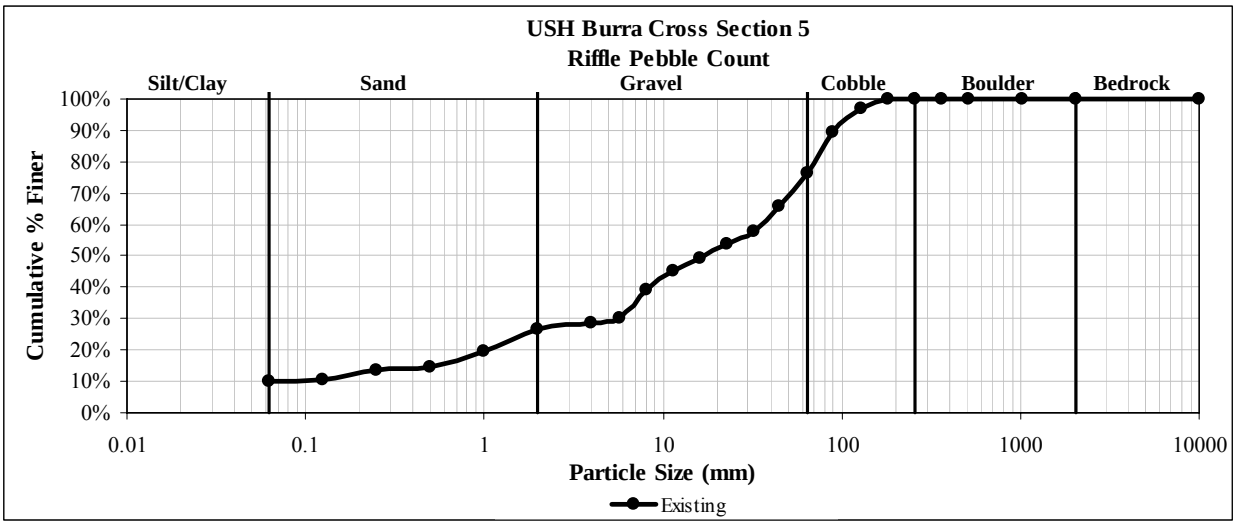
USH Bura Cross Section 2 Riffle Pebble Count			
	Particle Size by Category		
Category	Existing	MY0	MY1
D16 (mm)	5.5		
D35 (mm)	12.9		
D50 (mm)	24.5		
D84 (mm)	104.0		
D95 (mm)	164.4		
	Percent Bed Material by Category		
Category	Existing	MY0	MY1
Silt/Clay	0.0		
Sand	12.0		
Gravel	64.0		
Cobble	24.0		
Boulder	1.0		
Bedrock	0.0		

Figure D.4 Continued



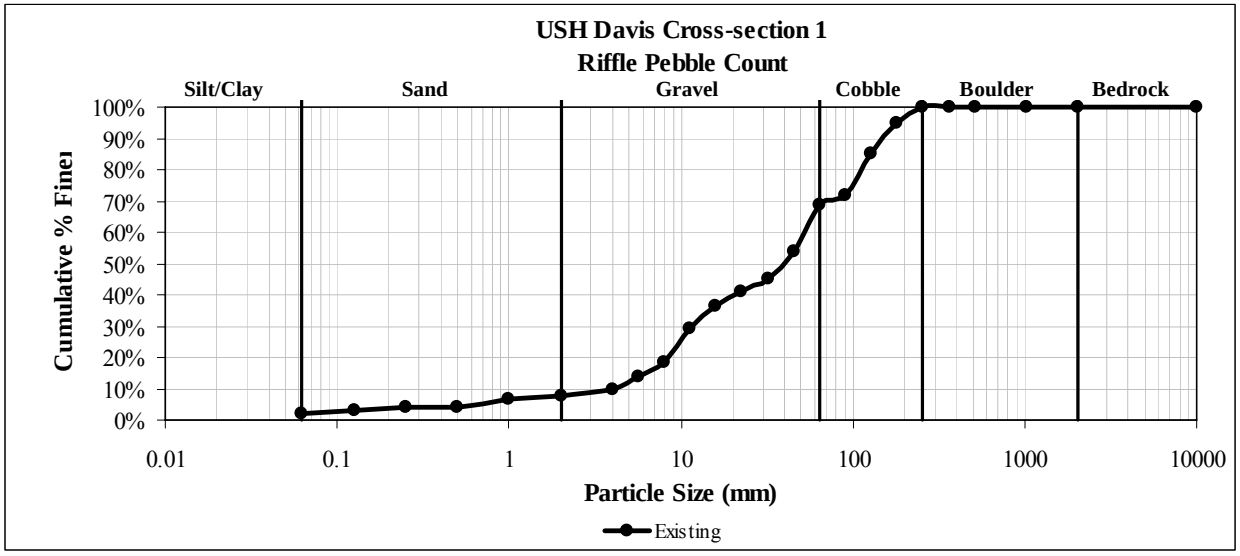
USH Bura Cross Section 4 Riffle Pebble Count			
	Particle Size by Category		
Category	Existing	MY0	MY1
D16 (mm)	1.0		
D35 (mm)	22.6		
D50 (mm)	35.3		
D84 (mm)	96.3		
D95 (mm)	245.1		
	Percent Bed Material by Category		
Category	Existing	MY0	MY1
Silt/Clay	0.0		
Sand	16.0		
Gravel	58.0		
Cobble	22.0		
Boulder	4.0		
Bedrock	0.0		

Figure D.4 Continued



USH Bura Cross Section 5 Riffle Pebble Count			
	Particle Size by Category		
Category	Existing	MY0	MY1
D16 (mm)	0.6		
D35 (mm)	6.9		
D50 (mm)	17.3		
D84 (mm)	79.4		
D95 (mm)	118.0		
	Percent Bed Material by Category		
Category	Existing	MY0	MY1
Silt/Clay	10.0		
Sand	17.0		
Gravel	50.0		
Cobble	24.0		
Boulder	0.0		
Bedrock	0.0		

Figure D.4 Continued



USH Davis Cross Section 1 Riffle Pebble Count			
	Particle Size by Category		
Category	Existing	MY0	MY1
D16 (mm)	6.8		
D35 (mm)	15.1		
D50 (mm)	39.2		
D84 (mm)	124.4		
D95 (mm)	179.5		
	Percent Bed Material by Category		
Category	Existing	MY0	MY1
Silt/Clay	2.0		
Sand	6.0		
Gravel	61.0		
Cobble	31.0		
Boulder	0.0		
Bedrock	0.0		

Figure D.5 Existing Conditions Photograph Log, Upper South Hominy Mitigation Site.

Bianculli Property, Tributary North, UT1 - (Preservation)

Origin of UT1 on Bianculli property.

Facing upstream on Bianculli UT1, area above small barn.

Facing downstream on Bianculli UT1, area adjacent to small barn

Figure D.5 Continued

Bianculli Property, Tributary North, UT1 – (Restoration)

UT1 facing downstream, incised from past mechanized dredging.

Woodland floodplain of Priority I channel construction.

UT1 facing downstream, rough culvert crossing to be removed.

Figure D.5 Continued

Bianculli Property, Tributary, UT2 – (Enhancement II)

UT2 facing upstream, livestock exclusion and invasive removal proposed.

UT2 facing downstream, livestock exclusion and invasive removal proposed.

Figure D.5 Continued

Bianculli Property, Tributary South, UT2 – (Restoration)

Lower portion of UT2 routed away from original channel when driveway was constructed.

UT2 contained in roadside ditch before entering South Hominy Creek.

Figure D.5 Continued

Bianculli Property, South Hominy Creek – (Restoration)

Mid channel bar aggradation, sta. 0+25, facing downstream.

Right bank sloughing, sta.1+00 to 2+00, facing downstream.

Channel blockage, sta.2+50, facing downstream.

Right bank erosion, high near bank stress, sta. 5+00 to 6+00, facing downstream.

Figure D.5 Continued

Bianculli Property, South Hominy Creek – (Enhancement II)

Adequate riparian vegetation, sta. 6+00 to 7+70, facing downstream.

Driveway bridge at lower end of Bianculli property, facing downstream.

Figure D.5 Continued

Roberson Property, Abandoned Channel, UT2 – (Restoration)

Upper portion of the abandoned channel, east of Canterfield Lane.

Lower portion of abandoned channel at confluence with SHC.

Figure D.5 Continued

Roberson Property, Wetland "D"(Enhancement)

Lower portion of Wetland D, facing upstream.

Wetland D, impacted by livestock access near mouth, facing upstream.

Figure D.5 Continued

Bura Property Left Bank, Roberson Property Right Bank, South Hominy Creek – (Restoration)

Livestock access right bank, sta.1+00 to 1+50, facing downstream.

Mid channel aggradation, over-wide, sta. 1+50 to 2+50, facing downstream.

Figure D.5 Continued

Bura Left Bank, Roberson Right Bank, South Hominy Creek – (Enhancement II)

Large pool feature, sta.3+50, facing downstream.

Mature woody vegetation adjacent to enhancement II reach, facing downstream.

Typical features along channel in enhancement II reach, facing downstream

Lower portion of enhancement II reach, sta.6+25 to 725, facing downstream.

Figure D.5 Continued

Bura Left Bank, Roberson Right Bank, South Hominy Creek – (Restoration)

Outside meander bend bank stress, 7+25 to 8+00, facing downstream.

Sloughing bank, sta. 7+75, facing downstream.

Near bank stress and channel constriction, sta.9+00 to 9+50, facing downstream.

Bed aggradation and transverse bar formation, sta. 9+50 to 9+75, facing downstream.

Figure D.5 Continued

Bura Left Bank, Roberson Right Bank, South Hominy Creek – (Enhancement II)

Bank shaping and invasive vegetation control proposed for left and right banks, sta.10+00 to 11+50.

Lower portion of enhancement II, sta. 11+50 to 11+75, facing downstream.

Figure D.5 Continued

Bura Left Bank, Roberson Right Bank, South Hominy Creek – (Restoration)

New alignment proposed, sta. 12+00 to 12+50, facing downstream.

Driveway bridge at lower end of Bura/Roberson properties, sta. 12+50, facing downstream.

Figure D.5 Continued

Davis Property, Unnamed Tributary, UT3 – (Preservation)

Middle portion of preservation area, facing downstream

Lower portion of preservation area, facing downstream.

Davis Property, Unnamed Tributary, UT3 – (Enhancement II))

Channel incision from mechanized dredging and invasive vegetation present along entire enhancement II portion, right to left bank.

Channel incision and lack of riparian vegetation, lower portion of the enhancement II section, facing downstream.

Figure D.5 Continued

Davis Property, Unnamed Tributary, UT3 – (Restoration)

Severe entrenchment and head cutting, upper portion of restoration section, below wet ford facing downstream.

Priority I restoration proposed for lower portion of UT, facing downstream.

Figure D.5 Continued

Davis Property, South Hominy Creek – (Enhancement I)

J-hook proposed, sta. 0+50, facing downstream.

Location of cross-section 1, sta. 1+60, facing downstream.

In-stream structures proposed to enhance habitat features, sta. 2+00 4+50, facing downstream.

Lower end of enhancement I reach, facing downstream.

Figure D.5 Continued

Davis Property, South Hominy Creek – (Enhancement II)

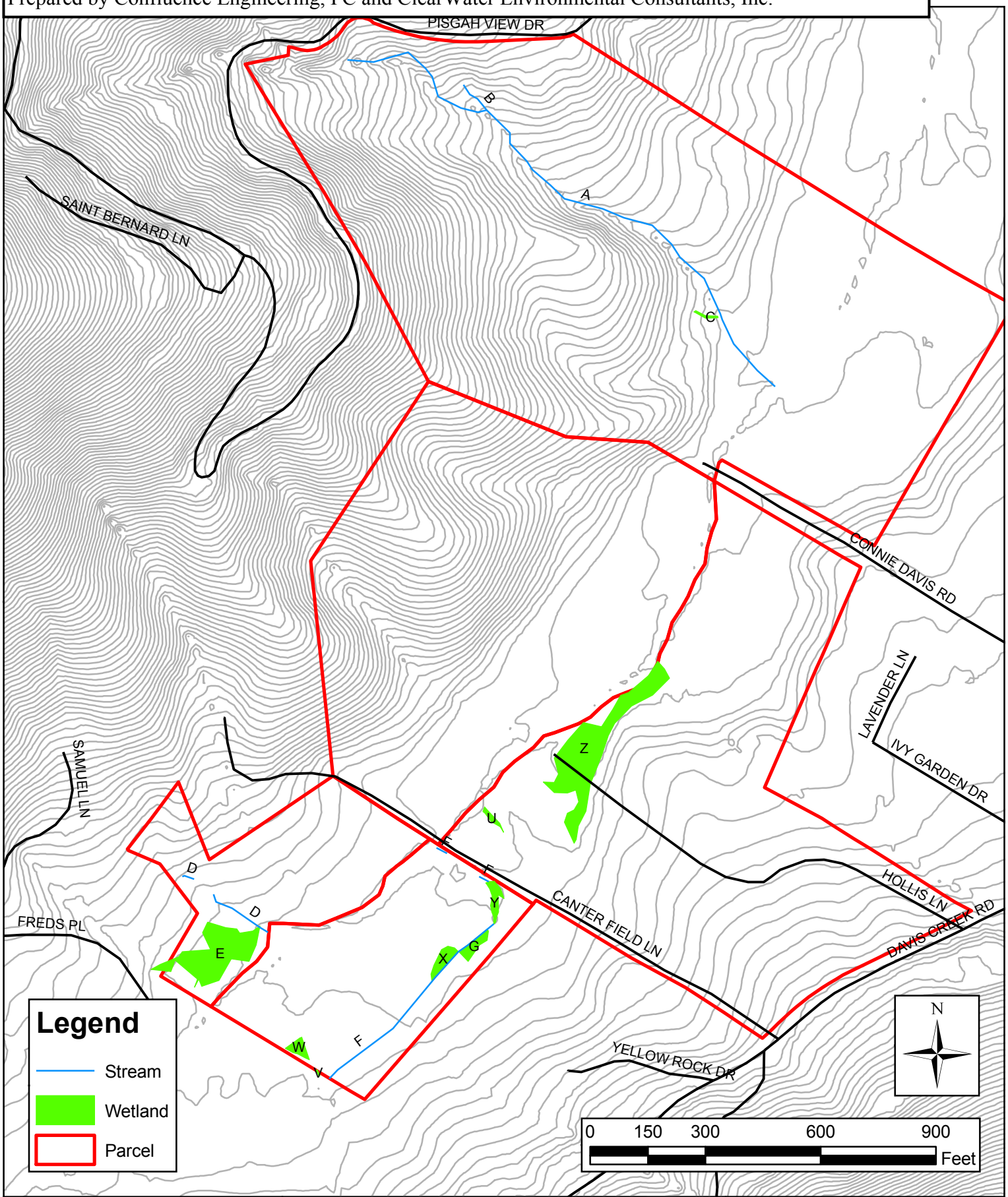
Upper extent of enhancement II section, location of cross-section 2, Sta. 5+00, facing downstream.

Typical features and vegetation present along enhancement II reach, facing downstream.

Channel incision and invasive vegetation observed, sta. 6+00 to 7+00, facing downstream.

Lower end of Davis property, sta. 7+50, end of project next riffle.

Figure D.6 Wetland Map, Wetland Pictures, USACE Wetland Determination Forms, and Documentation
Prepared by Confluence Engineering, PC and ClearWater Environmental Consultants, Inc.



Buncombe County, North Carolina	ClearWater Environmental Consultants, Inc.	Site Map

Figure D.6 Continued

Wetland C, spring box at origin, Davis property.

Wetland C, facing upstream Davis property

Wetland D, Area of cattle crossing, Roberson property

Wetland D, Roberson property

Figure D.6 Continued

Wetland D, Roberson property.

Wetland D, Roberson property.

Wetland D, Roberson property.

Wetland D, Roberson property.

Wetland D, Roberson property.

Figure D.6 Continued

Wetland E, UT2, Roberson property, facing southeast.

Wetland E, UT2, Roberson property, facing northwest.

Wetland G, UT2, Bianculli property.

Wetland I, UT2, Bianculli property, facing northeast.

Wetland K, Bianculli property.

Wetland L, Bianculli property

Figure D.6 Continued

Wetland L, Bianculli property.

Figure D.6 Continued

DATA □ORM
ROUTINE □ ETLAND DETERMINATION
(□9□□ COE □ etlands Determination Manual)

Project □Site: Upper Hominy – Wetland C **Applicant □O□ner:** EEP Restoration/Enhancement Project **Investigator:** CEC – Rebekah Newton	**Date:** Oct 09/Mar 10 **County:** Buncombe **State:** NC
Do normal circumstances e□ist on the site□ □es X No **Is the site signi□icantly disturbed (Atypical situation)□** □es No X **Is the area a potential problem area□** □es No X **(e□plain on reverse i□needed)**	**Community ID:** WL **Transect ID:** **Plot ID:**

□E□ETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
□. Carex spp	H	OBL	9.		
2. Juncus effuses	H	FACW+	□□.		
3. Polygonum sagittatum	H	OBL	□□.		
□. Pycnanthemum spp	H	FAC	□2.		
□.			□3.		
6.			□□.		
□.			□□.		
□.			□6.		

Percent o□Dominant Species that are OBL, □AC□ , or □AC e□cluding □AC□). 4/4 = 100%

Remarks:

H□DROLO□□

___ Recorded Data (Describe In Remarks):
- **___ Stream, Lake, or Tide □auge**
- **___ Aerial Photographs**
- **___ Other**

_x_ No Recorded Data Available

□ield Observations:

Depth o□Sur□ace □ ater: 0-2 **(in.)**

Depth to □ree □ ater in Pit: 0 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

□ etland Hydrology Indicators

Primary Indicators:
- **_x_ Inundated**
- **_x_ Saturated in Upper □2□**
- **___ □ ater Marks**
- **___ Dri□t Lines**
- **___ Sediment Deposits**
- **_x_ Drainage Patterns in □ etlands**

Secondary Indicators:
- **_x_ O□idi□ed Roots Channels in Upper □2□**
- **___ □ ater□Stained Leaves**
- **___ Local Soil Survey Data**
- **___ □AC□Neutral Test**
- **___ Other (E□plain in Remarks)**

Remarks:

SOILS

Map Unit Name
(Series and Phase): Tate **Drainage Class:** Well drained.

Ta□onomy (Subgroup): _____ **Con□irm Mapped Type□ □es**___ **No**___

Pro□ile Description:

Depth (inches)	Hori□on	Matri□ Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance□Contrast	Te□ture, Concretions, Structure, etc.
0-8	A	10YR4/2	10YR5/6	many/faint	loam

Hydric Soil Indicators:

____ Histosol	____ Concretions
____ Histic Epipedon	____ High Organic Content in Sur□ace Layer in Sandy Soils
_x_ Sul□idic Odor	____ Organic Streaking in Sandy Soils
____ A□uic Moisture Regime	____ Listed On Local Hydric Soils List
_x_ Reducing Conditions	____ Listed on National Hydric Soils List
_x_ □leyed or Lo□ □Chroma Colors	____ Other (E□plain in Remarks)

Remarks:

□ ETLAND DETERMINATION

Hydrophytic □egetation Present□ □es _x_ No ____
□ etland Hydrology Present□ □es _x_ No ____
Hydric Soils Present□ □es _x_ No ____

Is the Sampling Point □ ithin a □ etland□ □es_x_ No___

Remarks:

DATA □ORM
ROUTINE □ ETLAND DETERMINATION
(□9□□ COE □ etlands Determination Manual)

Project □Site: Upper Hominy – Wetland D **Applicant □O□ner:** EEP Restoration/Enhancement Project **Investigator:** CEC – Rebekah Newton	**Date:** Oct 09/Mar 10 **County:** Buncombe **State:** NC
Do normal circumstances e□ist on the site□ □es X No **Is the site signi□icantly disturbed (Atypical situation)□** □es No X **Is the area a potential problem area□** □es No X **(e□plain on reverse i□needed)**	**Community ID:** WL **Transect ID:** **Plot ID:**

□E□ETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
□. Acer rubrum	T	FAC	9. Polygonum sagittatum	H	OBL
2. Carex spp	H	OBL	□□. Ranunculus abortivus	H	FAC
3. Eupatorium maculatum	H	FACW-	□□. Salix nigra	T	OBL
□. Impatiens capensis	H	FACW	□2. Sambucus canadensis	S	FACW-
□. Lobelia cardinalis	H	FACW+	□3. Solidago spp	H	FAC
6. Myosotis laxa	H	OBL	□□. Symphyotrichum novae-angliae	H	FACW
□. Platanus occidentalis	T	FACW-	□□. Vernonia noveboracensis	H	FAC+
□. Polygonum pensylvanicum	H	FACW	□6.		

Percent o□Dominant Species that are OBL, □AC□ , or □AC e□cluding □AC□). 15/15 = 100%

Remarks:

H□DROLO□□

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide □auge**
- ___ **Aerial Photographs**
- ___ **Other**

_x_ **No Recorded Data Available**

□ield Observations:

Depth o□Sur□ace □ ater: 0-5 **(in.)**

Depth to □ree □ ater in Pit: 0 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

□ etland Hydrology Indicators

Primary Indicators:
- _x_ **Inundated**
- _x_ **Saturated in Upper □2□**
- _x_ **□ ater Marks**
- ___ **Dri□t Lines**
- ___ **Sediment Deposits**
- _x_ **Drainage Patterns in □ etlands**

Secondary Indicators:
- _x_ **O□idi□ed Roots Channels in Upper □2□**
- ___ **□ ater□Stained Leaves**
- ___ **Local Soil Survey Data**
- ___ **□AC□Neutral Test**
- ___ **Other (E□plain in Remarks)**

Remarks:

SOILS

Map Unit Name
(Series and Phase): Iotla **Drainage Class:** Somewhat poorly drained.

Ta□onomy (Subgroup): _____ **Con□irm Mapped Type□ □es____ No____**

Pro□ile Description:

Depth (inches)	Hori□on	Matri□ Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance□Contrast	Te□ture, Concretions, Structure, etc.
0-7	A	10YR4/2	10YR5/4	many/distinct	loam

Hydric Soil Indicators:

____ **Histosol**
____ **Histic Epipedon**
_x_ **Sul□idic Odor**
____ **A□uic Moisture Regime**
_x_ **Reducing Conditions**
_x_ **□leyed or Lo□ □Chroma Colors**
____ **Concretions**
____ **High Organic Content in Sur□ace Layer in Sandy Soils**
____ **Organic Streaking in Sandy Soils**
____ **Listed On Local Hydric Soils List**
____ **Listed on National Hydric Soils List**
____ **Other (E□plain in Remarks)**

Remarks:

□ ETLAND DETERMINATION

Hydrophytic □egetation Present□ **□es** _x_ **No** ____
□ etland Hydrology Present□ **□es** _x_ **No** ____
Hydric Soils Present□ **□es** _x_ **No** ____

Is the Sampling Point □ ithin a □ etland□ **□es** _x_ **No**____

Remarks:

DATA □ORM
ROUTINE □ ETLAND DETERMINATION
(□9□□ COE □ etlands Determination Manual)

Project □Site: Upper Hominy – Wetland E
Applicant □O□ner: EEP Restoration/Enhancement Project
Investigator: CEC – Rebekah Newton

Date: Oct 09/Mar 10
County: Buncombe
State: NC

Do normal circumstances e□ist on the site□ □es X No
Is the site signi□icantly disturbed (Atypical situation)□ □es No X
Is the area a potential problem area□ □es No X
(e□plain on reverse i□needed)

Community ID: WL
Transect ID:
Plot ID:

□E□ETATION

Dominant Plant Species	Stratum	Indicator
□. Impatiens capensis	H	FACW
2. Juncus effuses	H	FACW+
3. Ligustrum sinense	S	FAC-
□. Polygonum pensylvanicum	H	FACW
□. Ranunculus abortivus	H	FAC
6. Solidago	H	FAC
□.		
□.		

Dominant Plant Species	Stratum	Indicator
9.		
□□.		
□□.		
□2.		
□3.		
□□.		
□□.		
□6.		

Percent o□Dominant Species that are OBL, □AC□ , or □AC e□cluding □AC□). 5/6 = 83%

Remarks:

H□DROLO□□

___ Recorded Data (Describe In Remarks):
- **___ Stream, Lake, or Tide □auge**
- **___ Aerial Photographs**
- **___ Other**

_x_ No Recorded Data Available

□ield Observations:

Depth o□Sur□ace □ ater: 0-1 **(in.)**

Depth to □ree □ ater in Pit: 0 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

□ etland Hydrology Indicators

Primary Indicators:
- **_x_ Inundated**
- **_x_ Saturated in Upper □2□**
- **____ □ ater Marks**
- **____ Dri□t Lines**
- **____ Sediment Deposits**
- **_x_ Drainage Patterns in □ etlands**

Secondary Indicators:
- **_x_ O□idi□ed Roots Channels in Upper □2□**
- **____ □ ater□Stained Leaves**
- **____ Local Soil Survey Data**
- **____ □AC□Neutral Test**
- **____ Other (E□plain in Remarks)**

Remarks:

SOILS

Map Unit Name
(Series and Phase): Iotla **Drainage Class:** Somewhat poorly drained.

Ta□onomy (Subgroup): _____ **Con□irm Mapped Type□ □es____ No____**

Pro□ile Description:

Depth (inches)	Hori□on	Matri□ Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance□Contrast	Te□ture, Concretions, Structure, etc.
0-7	A	10YR4/2	10YR5/4	many/distinct	loam

Hydric Soil Indicators:

____ **Histosol**
____ **Histic Epipedon**
_x_ **Sul□idic Odor**
____ **A□uic Moisture Regime**
_x_ **Reducing Conditions**
_x_ **□leyed or Lo□ □Chroma Colors**
____ **Concretions**
____ **High Organic Content in Sur□ace Layer in Sandy Soils**
____ **Organic Streaking in Sandy Soils**
____ **Listed On Local Hydric Soils List**
____ **Listed on National Hydric Soils List**
____ **Other (E□plain in Remarks)**

Remarks:

□ ETLAND DETERMINATION

Hydrophytic □egetation Present□ **□es** _x_ **No** ____
□ etland Hydrology Present□ **□es** _x_ **No** ____
Hydric Soils Present□ **□es** _x_ **No** ____

Is the Sampling Point □ ithin a □ etland□ **□es** _x_ **No**____

Remarks:

DATA □ORM
ROUTINE □ ETLAND DETERMINATION
(□9□□ COE □ etlands Determination Manual)

Project □Site: Upper Hominy – Wetland G **Applicant □O□ner:** EEP Restoration/Enhancement Project **Investigator:** CEC – Rebekah Newton	**Date:** Oct 09/Mar 10 **County:** Buncombe **State:** NC
Do normal circumstances e□ist on the site□ □es X No **Is the site signi□icantly disturbed (Atypical situation)□** □es No X **Is the area a potential problem area□** □es No X **(e□plain on reverse i□needed)**	**Community ID:** WL **Transect ID:** **Plot ID:**

□E□ETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
□. Acer rubrum	T	FAC	9.		
2. Carex spp	H	OBL	□□.		
3. Impatiens capensis	H	FACW	□□.		
□. Juncus effuses	H	FACW+	□2.		
□. Polygonum pensylvanicum	H	FACW	□3.		
6. Solidago spp	H	FAC	□□.		
□. Scirpus cyperinus	H	OBL	□□.		
□. Symphyotrichum novae-angliae	H	FACW	□6.		

Percent o□Dominant Species that are OBL, □AC□ , or □AC e□cluding □AC□). 8/8 = 100%

Remarks:

H□DROLO□□

___ Recorded Data (Describe In Remarks):
- **___ Stream, Lake, or Tide □auge**
- **___ Aerial Photographs**
- **___ Other**

_x_ No Recorded Data Available

□ield Observations:

Depth o□Sur□ace □ ater: 0-3 **(in.)**

Depth to □ree □ ater in Pit: 0 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

□ etland Hydrology Indicators

Primary Indicators:
- **_x_ Inundated**
- **_x_ Saturated in Upper □2□**
- **_x_ □ ater Marks**
- **___ Dri□t Lines**
- **___ Sediment Deposits**
- **_x_ Drainage Patterns in □ etlands**

Secondary Indicators:
- **_x_ O□idi□ed Roots Channels in Upper □2□**
- **___ □ ater□Stained Leaves**
- **___ Local Soil Survey Data**
- **___ □AC□Neutral Test**
- **___ Other (E□plain in Remarks)**

Remarks:

SOILS

Map Unit Name
(Series and Phase): Dillard **Drainage Class:** Moderately well drained.

Ta□onomy (Subgroup): _____ **Con□irm Mapped Type□ □es**____ **No**____

Pro□ile Description:

Depth (inches)	Hori□on	Matri□ Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance□Contrast	Te□ture, Concretions, Structure, etc.
0-8	A	10YR4/2	10YR5/3	common/faint	loam

Hydric Soil Indicators:

____ **Histosol**
____ **Histic Epipedon**
_x_ **Sul□idic Odor**
____ **A□uic Moisture Regime**
_x_ **Reducing Conditions**
_x_ **□leyed or Lo□ □Chroma Colors**
____ **Concretions**
____ **High Organic Content in Sur□ace Layer in Sandy Soils**
____ **Organic Streaking in Sandy Soils**
____ **Listed On Local Hydric Soils List**
____ **Listed on National Hydric Soils List**
____ **Other (E□plain in Remarks)**

Remarks:

□ ETLAND DETERMINATION

Hydrophytic □egetation Present□ **□es** _x_ **No** ____
□ etland Hydrology Present□ **□es** _x_ **No** ____
Hydric Soils Present□ **□es** _x_ **No** ____

Is the Sampling Point □ ithin a □ etland□ **□es** _x_ **No**____

Remarks:

DATA □ORM
ROUTINE □ ETLAND DETERMINATION
(□9□□ COE □ etlands Determination Manual)

Project □Site: Upper Hominy – Wetland H **Applicant □O□ner:** EEP Restoration/Enhancement Project **Investigator:** CEC – Rebekah Newton	**Date:** Oct 09/Mar 10 **County:** Buncombe **State:** NC
Do normal circumstances e□ist on the site□ □es X No **Is the site signi□icantly disturbed (Atypical situation)□** □es No X **Is the area a potential problem area□** □es No X **(e□plain on reverse i□needed)**	**Community ID:** WL **Transect ID:** **Plot ID:**

□E□ETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
□. Alnus serrulata	S	FACW	9.		
2. Carex spp	H	OBL	□□.		
3. Impatiens capensis	H	FACW	□□.		
□. Lindera benzoin	S	FACW	□2.		
□. Osmunda cinnamomea	H	FACW+	□3.		
6. Woodwardia areolata	H	OBL	□□.		
□.			□□.		
□.			□6.		

Percent o□Dominant Species that are OBL, □AC□ , or □AC e□cluding □AC□). 8/8 = 100%

Remarks:

H□DROLO□□

___ Recorded Data (Describe In Remarks):
- **___ Stream, Lake, or Tide □auge**
- **___ Aerial Photographs**
- **___ Other**

_x_ No Recorded Data Available

□ield Observations:

Depth o□Sur□ace □ ater: 0-3 **(in.)**

Depth to □ree □ ater in Pit: 0 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

□ etland Hydrology Indicators

Primary Indicators:
- **_x_ Inundated**
- **_x_ Saturated in Upper □2□**
- **_x_ □ ater Marks**
- **____ Dri□t Lines**
- **____ Sediment Deposits**
- **_x_ Drainage Patterns in □ etlands**

Secondary Indicators:
- **_x_ O□idi□ed Roots Channels in Upper □2□**
- **____ □ ater□Stained Leaves**
- **____ Local Soil Survey Data**
- **____ □AC□Neutral Test**
- **___ Other (E□plain in Remarks)**

Remarks:

SOILS

Map Unit Name
(Series and Phase): Dillard **Drainage Class:** Moderately well drained.

Ta□onomy (Subgroup): _____ **Con□irm Mapped Type□ □es____ No____**

Pro□ile Description:

Depth (inches)	Hori□on	Matri□ Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance□Contrast	Te□ture, Concretions, Structure, etc.
0-8	A	10YR4/2	10YR5/3	common/faint	loam

Hydric Soil Indicators:

____ Histosol
____ Histic Epipedon
_x_ Sul□idic Odor
____ A□uic Moisture Regime
_x_ Reducing Conditions
_x_ □leyed or Lo□ □Chroma Colors
____ Concretions
____ High Organic Content in Sur□ace Layer in Sandy Soils
____ Organic Streaking in Sandy Soils
____ Listed On Local Hydric Soils List
____ Listed on National Hydric Soils List
____ Other (E□plain in Remarks)

Remarks:

□ ETLAND DETERMINATION

Hydrophytic □egetation Present□ □es _x_ No ____
□ etland Hydrology Present□ □es _x_ No ____
Hydric Soils Present□ □es _x_ No ____

Is the Sampling Point □ ithin a □ etland□ □es_x_ No____

Remarks:

DATA □ORM
ROUTINE □ ETLAND DETERMINATION
(□9□□ COE □ etlands Determination Manual)

Project □Site: Upper Hominy – Wetland I **Applicant □O□ner:** EEP Restoration/Enhancement Project **Investigator:** CEC – Rebekah Newton	**Date:** Oct 09/Mar 10 **County:** Buncombe **State:** NC
Do normal circumstances e□ist on the site□ □es X No **Is the site signi□icantly disturbed (Atypical situation)□** □es No X **Is the area a potential problem area□** □es No X **(e□plain on reverse i□needed)**	**Community ID:** WL **Transect ID:** **Plot ID:**

□E□ETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
□. Carex spp	H	OBL	9.		
2. Eupatorium maculatum	H	FACW-	□□.		
3. Impatiens capensis	H	FACW	□□.		
□. Juncus effuses	H	FACW+	□2.		
□. Polygonum pensylvanicum	H	FACW	□3.		
6. Ranunculus abortivus	H	FAC	□□.		
□. Vernonia noveboracensis	H	FAC+	□□.		
□.			□6.		

Percent o□Dominant Species that are OBL, □AC□ , or □AC e□cluding □AC□). 7/7 = 100%

Remarks:

H□DROLO□□

___ Recorded Data (Describe In Remarks):
- **___ Stream, Lake, or Tide □auge**
- **___ Aerial Photographs**
- **___ Other**

_x_ No Recorded Data Available

□ield Observations:

Depth o□Sur□ace □ ater: 0-1 **(in.)**

Depth to □ree □ ater in Pit: 0 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

□ etland Hydrology Indicators

Primary Indicators:
- **_x_ Inundated**
- **_x_ Saturated in Upper □2□**
- **____ □ ater Marks**
- **____ Dri□t Lines**
- **____ Sediment Deposits**
- **____ Drainage Patterns in □ etlands**

Secondary Indicators:
- **_x_ O□idi□ed Roots Channels in Upper □2□**
- **____ □ ater□Stained Leaves**
- **____ Local Soil Survey Data**
- **____ □AC□Neutral Test**
- **___ Other (E□plain in Remarks)**

Remarks:

SOILS

Map Unit Name
(Series and Phase): Dillard **Drainage Class:** Moderately well drained.

Ta□onomy (Subgroup): _____ **Con□irm Mapped Type□ □es**___ **No**___

Pro□ile Description:

Depth (inches)	Hori□on	Matri□ Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance□Contrast	Te□ture, Concretions, Structure, etc.
0-8	A	10YR4/2	10YR5/3	common/faint	loam

Hydric Soil Indicators:

___ Histosol	___ Concretions
___ Histic Epipedon	___ High Organic Content in Sur□ace Layer in Sandy Soils
_x_ Sul□idic Odor	___ Organic Streaking in Sandy Soils
___ A□uic Moisture Regime	___ Listed On Local Hydric Soils List
_x_ Reducing Conditions	___ Listed on National Hydric Soils List
_x_ □leyed or Lo□ □Chroma Colors	___ Other (E□plain in Remarks)

Remarks:

□ ETLAND DETERMINATION

Hydrophytic □egetation Present□ □es _x_ **No** ___
□ etland Hydrology Present□ □es _x_ **No** ___
Hydric Soils Present□ □es _x_ **No** ___

Is the Sampling Point □ ithin a □ etland□ □es_x_ **No**___

Remarks:

DATA □ORM
ROUTINE □ ETLAND DETERMINATION
(□9□□ COE □ etlands Determination Manual)

Project □Site: Upper Hominy – Wetland J and K **Applicant □O□ner:** EEP Restoration/Enhancement Project **Investigator:** CEC – Rebekah Newton	**Date:** Oct 09/Mar 10 **County:** Buncombe **State:** NC
Do normal circumstances e□ist on the site□ □es X No **Is the site signi□icantly disturbed (Atypical situation)□** □es No X **Is the area a potential problem area□** □es No X **(e□plain on reverse i□needed)**	**Community ID:** WL **Transect ID:** **Plot ID:**

□E□ETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
□. Carex spp	H	OBL	9.		
2.			□□.		
3.			□□.		
□.			□2.		
□.			□3.		
6.			□□.		
□.			□□.		
□.			□6.		

Percent o□Dominant Species that are OBL, □AC□ , or □AC e□cluding □AC□). 1/1 = 100%

Remarks:

H□DROLO□□

___ Recorded Data (Describe In Remarks):
- **___ Stream, Lake, or Tide □auge**
- **___ Aerial Photographs**
- **___ Other**

_x_ No Recorded Data Available

□ield Observations:

Depth o□Sur□ace □ ater: 0-12 **(in.)**

Depth to □ree □ ater in Pit: 0 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

□ etland Hydrology Indicators

Primary Indicators:
- **_x_ Inundated**
- **_x_ Saturated in Upper □2□**
- **_x_ □ ater Marks**
- **____ Dri□t Lines**
- **____ Sediment Deposits**
- **_x_ Drainage Patterns in □ etlands**

Secondary Indicators:
- **_x_ O□idi□ed Roots Channels in Upper □2□**
- **____ □ ater□Stained Leaves**
- **____ Local Soil Survey Data**
- **____ □AC□Neutral Test**
- **___ Other (E□plain in Remarks)**

Remarks:

SOILS

Map Unit Name
(Series and Phase): Dillard **Drainage Class:** Moderately well drained.

Ta□onomy (Subgroup): _____ **Con□irm Mapped Type□ □es**____ **No**____

Pro□ile Description:

Depth (inches)	Hori□on	Matri□ Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance□Contrast	Te□ture, Concretions, Structure, etc.
0-8	A	10YR4/2	10YR5/3	common/faint	loam

Hydric Soil Indicators:

____ **Histosol**
____ **Histic Epipedon**
_x_ **Sul□idic Odor**
____ **A□uic Moisture Regime**
_x_ **Reducing Conditions**
_x_ **□leyed or Lo□ □Chroma Colors**
____ **Concretions**
____ **High Organic Content in Sur□ace Layer in Sandy Soils**
____ **Organic Streaking in Sandy Soils**
____ **Listed On Local Hydric Soils List**
____ **Listed on National Hydric Soils List**
____ **Other (E□plain in Remarks)**

Remarks:

□ ETLAND DETERMINATION

Hydrophytic □egetation Present□ **□es** _x_ **No** ____
□ etland Hydrology Present□ **□es** _x_ **No** ____
Hydric Soils Present□ **□es** _x_ **No** ____

Is the Sampling Point □ ithin a □ etland□ **□es** _x_ **No**____

Remarks:

DATA □ORM
ROUTINE □ ETLAND DETERMINATION
(□9□□ COE □ etlands Determination Manual)

Project □Site: Upper Hominy – Wetland L **Applicant □O□ner:** EEP Restoration/Enhancement Project **Investigator:** CEC – Rebekah Newton	**Date:** Oct 09/Mar 10 **County:** Buncombe **State:** NC
Do normal circumstances e□ist on the site□ □es X No **Is the site signi□icantly disturbed (Atypical situation)□** □es No X **Is the area a potential problem area□** □es No X **(e□plain on reverse i□needed)**	**Community ID:** WL **Transect ID:** **Plot ID:**

□E□ETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
□. Acer rubrum	T	FAC	9. Polygonum pensylvanicum	H	FACW
2. Alnus serrulata	S	FACW	□□. Smilax rotundifolia	S	FAC
3. Carpinus caroliniana	T	FAC	□□. Solidago spp	H	FAC
□. Impatiens capensis	H	FACW	□2. Thelypteris noveboracensis	H	FAC+
□. Ligustrum sinense	S	FAC-	□3.		
6. Lindera benzoin	S	FACW	□□.		
□. Liriodendron tulipifera	H	FAC	□□.		
□. Platanus occidentalis	T	FACW-	□6.		

Percent o□Dominant Species that are OBL, □AC□, or □AC e□cluding □AC□). 11/12 = 91%

Remarks:

H□DROLO□□

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide □auge**
- ___ **Aerial Photographs**
- ___ **Other**

_x_ **No Recorded Data Available**

□ield Observations:

Depth o□Sur□ace □ ater: 0-4 **(in.)**

Depth to □ree □ ater in Pit: 0 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

□ etland Hydrology Indicators

Primary Indicators:
- _x_ **Inundated**
- _x_ **Saturated in Upper □2□**
- _x_ **□ ater Marks**
- ___ **Dri□t Lines**
- ___ **Sediment Deposits**
- _x_ **Drainage Patterns in □ etlands**

Secondary Indicators:
- _x_ **O□idi□ed Roots Channels in Upper □2□**
- ___ **□ ater□Stained Leaves**
- ___ **Local Soil Survey Data**
- ___ **□AC□Neutral Test**
- ___ **Other (E□plain in Remarks)**

Remarks:

SOILS

Map Unit Name
(Series and Phase): Iotla **Drainage Class:** Somewhat poorly drained.

Ta□onomy (Subgroup): _____ **Con□irm Mapped Type□ □es____ No____**

Pro□ile Description:

Depth (inches)	Hori□on	Matri□ Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance□Contrast	Te□ture, Concretions, Structure, etc.
0-8	A	10YR4/2	10YR5/4	many/distinct	loam

Hydric Soil Indicators:

____ **Histosol**
____ **Histic Epipedon**
_x_ **Sul□idic Odor**
____ **A□uic Moisture Regime**
_x_ **Reducing Conditions**
_x_ **□leyed or Lo□ □Chroma Colors**
____ **Concretions**
____ **High Organic Content in Sur□ace Layer in Sandy Soils**
____ **Organic Streaking in Sandy Soils**
____ **Listed On Local Hydric Soils List**
____ **Listed on National Hydric Soils List**
____ **Other (E□plain in Remarks)**

Remarks:

□ ETLAND DETERMINATION

Hydrophytic □egetation Present□ **□es** _x_ **No** ____
□ etland Hydrology Present□ **□es** _x_ **No** ____
Hydric Soils Present□ **□es** _x_ **No** ____

Is the Sampling Point □ ithin a □ etland□ **□es** _x_ **No**____

Remarks:

Figure D.7 Entrainment Calculations for the Upper South Hominy Mitigation Site.

Entrainment Form

Stream: South Hominy Cr Reach: Burra XS4 Team: WRC Date:

Enter Required Information				
35.25	D_{50}	Riffle bed material D50 (mm)		
11.69	$D_{50}^{\wedge}$	Bar sample D50 (mm)		
0.3215	D_i	Largest particle from bar sample (feet)	98 (mm)	304.8 mm/foot
0.009	S	Existing bankfull water surface slope		
2.2	d	Existing bankfull mean depth (ft)		
1.65	γ_s	Submerged specific weight of sediment		

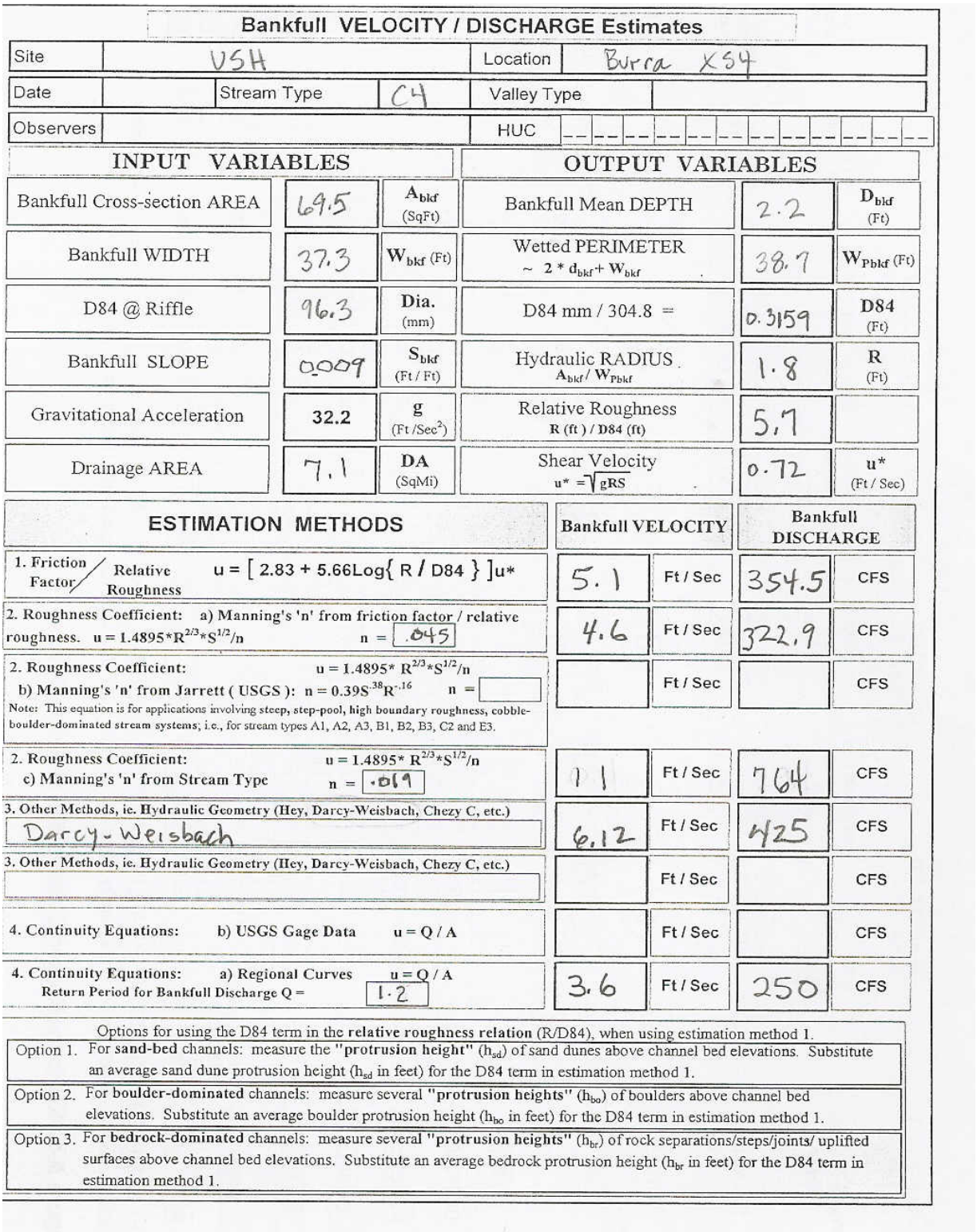
Select the Appropriate Equation and Calculate Critical Dimensionless Shear Stress				
3.02	$D_{50}/D_{50}^{\wedge}$	Range: 3 - 7	USE EQUATION 1:	$\tau_{ci}^{*} = 0.0834\left(D_{50}/D_{50}^{\wedge}\right)^{-0.872}$
2.78	D_i/D_{50}	Range: 1.3 - 3.0	USE EQUATION 2:	$\tau_{ci}^{*} = 0.0384\left(D_i/D_{50}\right)^{-0.887}$
0.0318 (1) 0.0155 (2)	τ_{ci}^{*}	Critical Dimensionless Shear Stress		

Calculate Bankfull Mean Depth Required for Entrainment of Largest Particle in Bar Sample:			
1.9 (1) 0.9 (2)	d_r	Required bankfull mean depth (ft)	$d_r = \frac{\tau_{ci}^{*}\gamma_s D_i}{S}$
	Circle:	Stable Aggrading Degrading	

Calculate BKF Water Surface Slope Required for Entrainment of Largest Particle in Bar Sample:			
0.068 (1) 0.003 (2)	S_r	Required bankfull water surface slope (ft)	$S_r = \frac{\tau_{ci}^{*}\gamma_s D_i}{d}$
	Circle:	Stable Aggrading Degrading	

Sediment Transport Validation	
1.0	Bankfull Shear Stress $\tau_c=\gamma RS$ (lb/ft^2)
71	Moveable particle size (mm) at bankfull shear stress (predicted by the Shields Diagram).
160	Moveable particle size (mm) at bankfull shear stress (predicted by the Colorado τ_{ci} data).
1.2	Predicted shear stress (lb/ft^2) required to initiate movement of D_i (mm) (see Shields Diagram).
0.5	Predicted shear stress (lb/ft^2) required to initiate movement of D_i (mm) (see Colorado τ_{ci} data).

Figure D.8 Bankfull Velocity and Discharge Estimates for the Upper South Hominy Mitigation Site.



Bankfull VELOCITY / DISCHARGE Estimates

Site	USH		Location	Burra XS4	
Date		Stream Type	C4	Valley Type	
Observers			HUC		

INPUT VARIABLES			OUTPUT VARIABLES		
Bankfull Cross-section AREA	69.5	A_{bkf} (SqFt)	Bankfull Mean DEPTH	2.2	D_{bkf} (Ft)
Bankfull WIDTH	37.3	W_{bkf} (Ft)	Wetted PERIMETER ~ $2 * d_{bkf} + W_{bkf}$	38.7	W_{Pbkf} (Ft)
D84 @ Riffle	96.3	Dia. (mm)	D84 mm / 304.8 =	0.3159	D84 (Ft)
Bankfull SLOPE	0.009	S_{bkf} (Ft / Ft)	Hydraulic RADIUS A_{bkf} / W_{Pbkf}	1.8	R (Ft)
Gravitational Acceleration	32.2	g (Ft/Sec^2)	Relative Roughness R (ft) / D84 (ft)	5.7	
Drainage AREA	7.1	DA (SqMi)	Shear Velocity $u^* = \sqrt{gRS}$	0.72	u* (Ft / Sec)

ESTIMATION METHODS	Bankfull VELOCITY		Bankfull DISCHARGE	
1. Friction Factor / Relative Roughness $u = [\ 2.83 + 5.66 \text{Log}\{ R / D84 \}]u^*$	5.1	Ft / Sec	354.5	CFS
2. Roughness Coefficient: a) Manning's 'n' from friction factor / relative roughness. $u = 1.4895 * R^{2/3} * S^{1/2} / n$ $n =$ .045	4.6	Ft / Sec	322.9	CFS
2. Roughness Coefficient: $u = 1.4895 * R^{2/3} * S^{1/2} / n$ b) Manning's 'n' from Jarrett (USGS): $n = 0.39 S^{.38} R^{-.16}$ $n =$ Note: This equation is for applications involving steep, step-pool, high boundary roughness, cobble-boulder-dominated stream systems; i.e., for stream types A1, A2, A3, B1, B2, B3, C2 and E3.		Ft / Sec		CFS
2. Roughness Coefficient: $u = 1.4895 * R^{2/3} * S^{1/2} / n$ c) Manning's 'n' from Stream Type $n =$ .069	11	Ft / Sec	764	CFS
3. Other Methods, ie. Hydraulic Geometry (Hey, Darcy-Weisbach, Chezy C, etc.) Darcy-Weisbach	6.12	Ft / Sec	425	CFS
3. Other Methods, ie. Hydraulic Geometry (Hey, Darcy-Weisbach, Chezy C, etc.)		Ft / Sec		CFS
4. Continuity Equations: b) USGS Gage Data $u = Q / A$		Ft / Sec		CFS
4. Continuity Equations: a) Regional Curves $u = Q / A$ Return Period for Bankfull Discharge Q = 1.2	3.6	Ft / Sec	250	CFS

Options for using the D84 term in the **relative roughness relation** (R/D84), when using estimation method 1.

Option 1. For **sand-bed** channels: measure the **"protrusion height"** (h_{sd}) of sand dunes above channel bed elevations. Substitute an average sand dune protrusion height (h_{sd} in feet) for the D84 term in estimation method 1.

Option 2. For **boulder-dominated** channels: measure several **"protrusion heights"** (h_{bo}) of boulders above channel bed elevations. Substitute an average boulder protrusion height (h_{bo} in feet) for the D84 term in estimation method 1.

Option 3. For **bedrock-dominated** channels: measure several **"protrusion heights"** (h_{br}) of rock separations/steps/joints/ uplifted surfaces above channel bed elevations. Substitute an average bedrock protrusion height (h_{br} in feet) for the D84 term in estimation method 1.

Appendix E

Farm Conservation Plan, Maps, and Tables for the Bianculli, Roberson, and Davis Properties, Upper South Hominy Mitigation Site.

Bianculli Property

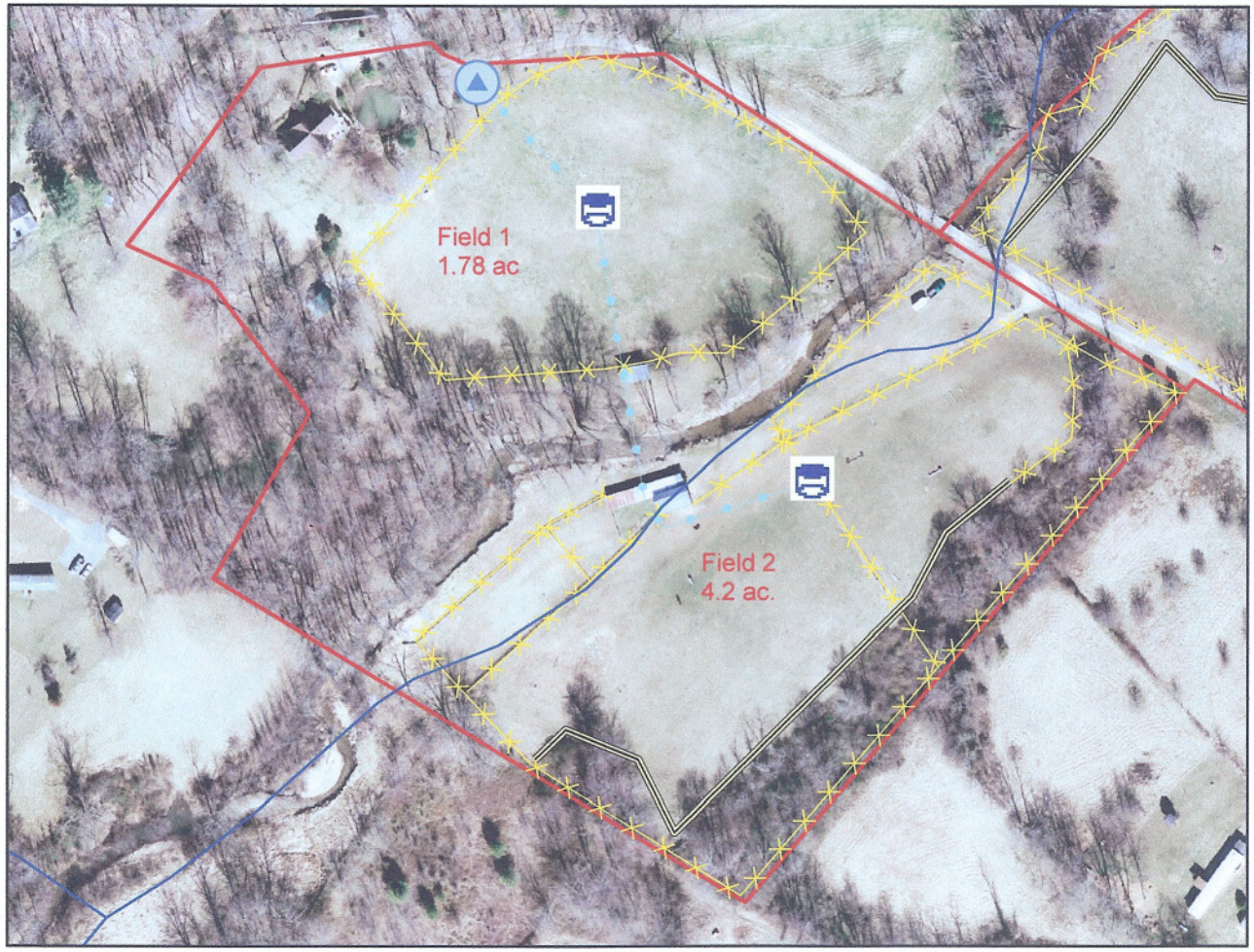
Conservation Plan Outline

Stream Restoration Project Number 08FB05-2
Farm 6838
Tract 5153
Total Acres 12.0

Field 1	**Stream Protection System**	**Cost**
1.78ac.	**1 Well**	**$7,800.00**
	1 Pump	**$2,667.00**
	1 Pump House	**$350.00**
	1 Pressurized Watering Tank	**$1,333.00**
	360’ 1” Pipe	**$745.00**
	100yds Filter Cloth	**$225.00**
	32 ton Stone	**$774.00**
	30 Pipe Fittings	**$90.00**
Field 2	**1 Pressurized Watering Tank**	**$1,333.00**
4.2ac.	**320’ 1” Pipe**	**$663.00**
	100yds Filter Cloth	**$225.00**
	32 ton Stone	**$774.00**
	700’ Fence	**$1,750.00**
Projected Project Sub-Total		**$18,729.00**

Bianculli Property

Conservation Plan Map



N

Legend

BMP_points

Type

- Cost Shared Water Well
- Existing Water Well
- Gravity feed Tank
- Pressurized Water Tank
- Spring Development
- Stream Crossing

BMP_Lines

type

- Animal Trails and Walkways
- Existing Cost Shared Fencing
- ExistingFencing
- PlannedFencing
- Water Line

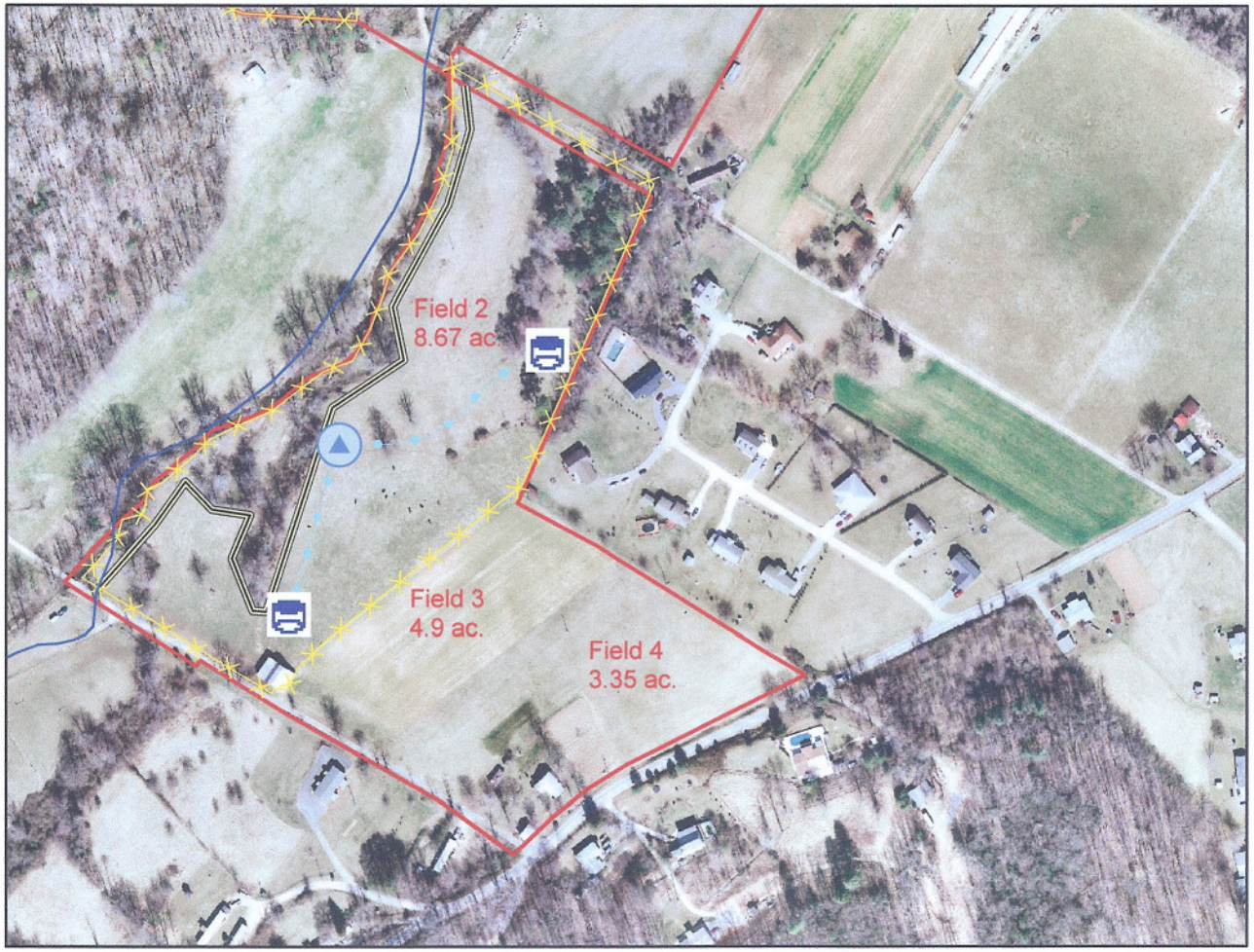
Tract 5153
Farm 6838

0 80 160 320 480 640 Feet

James Roberson
Conservation Plan Outline
Stream Restoration Project Number 08FB05-2
Farm 1770
Tract 3903
Total Acres 19.07

Field 2	Stream Protection System	Cost
8.67ac.	1 Well	$7,800.00
	1 Pump	$2,667.00
	1 Pump House	$350.00
	2 Pressurized Watering Tank	$2,667.00
	820’ 1” Pipe	$1,697.00
	200yds Filter Cloth	$450.00
	64 ton Stone	$1,549.00
	1,760’ Fence	$4,488.00
	30 Pipe Fittings	$90.00
Projected Project Sub-Total		**$21,758.00**

James Roberson
Conservation Plan Map



N

Legend

BMP_points

Type

- Cost Shared Water Well
- Existing Water Well
- Gravity feed Tank
- Pressurized Water Tank
- Spring Development
- Stream Crossing

BMP_Lines

type

- Animal Trails and Walkways
- Existing Cost Shared Fencing
- ExistingFencing
- PlannedFencing
- Water Line

Tract 3903
Farm 1770

0 145 290 580 870 1,160 Feet

Julia Davis
Conservation Plan Outline
Stream Restoration Project Number 08FB05-2
Farm 1924
Tract 3520
Total Acres 34.57

Field 1	**Stream Protection System**	**Cost**
2.42ac.	**940’ Fence**	**$2,397.00**
Field 2	**1 Well**	**$7,800.00**
1.91ac.	**1 Pump**	**$2,667.00**
	1 Pump House	**$350.00**
	1 Pressurized Watering Tank	**$1,333.00**
	280’ 1” Pipe	**$580.00**
	100yds Filter Cloth	**$225.00**
	32 ton Stone	**$774.00**
	950’ Fence	**$2,423.00**
	45 Pipe Fittings	**$135.00**
Field 3	**1 Pressurized Watering Tank**	**$1,333.00**
4.63ac.	**600’ 1” Pipe**	**$1,242.00**
	100yds Filter Cloth	**$225.00**
	32 ton Stone	**$774.00**
	900’ Fence	**$2,295.00**
	500’ Fence	**$1,275.00**
Projected Project Sub-Total		**$25,828.00**
Projected Project Total :		**$66,315.00**

Julia Davis
Conservation Plan Map

N

Legend

BMP_points

Type

- Cost Shared Water Well
- Existing Water Well
- Gravity feed Tank
- Pressurized Water Tank
- Spring Development
- Stream Crossing

BMP_Lines

type

- Animal Trails and Walkways
- Existing Cost Shared Fencing
- ExistingFencing
- PlannedFencing
- Water Line

Tract 3520
Farm 1924

0 145 290 580 870 1,160 Feet

Appendix F

Construction Drawings, Design Typicals and Specifications, and Planting Plan, Upper South Hominy Mitigation Site.

Table F.1 Proposed Annual Seed Mix, Perennial Native Seed Mix, and Live Stake Species to be installed at the Upper South Hominy Mitigation Site.

Type	Common Name	Scientific Name	lbs/acre	Number
Annual seed	Annual rye	*Lolium multiflorum*		
	Browntop millet	*Panicum ramosum*		
		Total	60	
Perennial native seed	American bur-reed	*Sparganium americanum*		
	Arrow-leaved tearthumb	*Polygonum sagittatum*		
	Big bluestem	*Andropogon gerardii*		
	Blue vervain	*Verbena hastata*		
	Deer tongue	*Panicum clandestinum*		
	Green bulrush	*Scirpus atrovirens*		
	Hop sedge	*Carex lupulina*		
	Indian wood oats	*Chasmanthium latifolium*		
	Indiangrass	*Sorghastrum nutans*		
	Lance leaved coreopsis	*Coreopsis lanceolata*		
	Little bluestem	*Schizachyrium scoparium*		
	Many leaved bulrush	*Scirpus polyphyllus*		
	Nodding bur-marigold	*Bidens cernua*		
	Ox eye sunflower	*Heliopsis helianthoides*		
	Partridge pea	*Chamaecrista fasciculata*		
	Purple cone flower	*Echinacea purpurea*		
	Showy evening primrose	*Oenothera speciosa*		
	Smooth panic grass	*Panicum dichotomiflorum*		
	Soft rush	*Juncus effusus*		
	Softstem bulrush			
	Switch grass	*Panicum virgatum*		
	Virginia wild rye	*Elymus virginicus*		
		Total	15	
Live stakes	Ninebark	*Physocarpus opulifolius*		1,400
	Silky dogwood	*Cornus amomum*		2,800
	Silky willow	*Salix sericea*		1,400
		Total		5,600

Table F.2 Proposed Shrub and Tree Species to be Installed at the Upper South Hominy Mitigation Site, Including Both Containerized Stock and Bare-Root Whips.

Type	Common Name	Scientific Name	Wildlife Value	Wetness Indicator	Number Proposed
Shrubs and small trees	American hazelnut	*Corylus americana*	B, Sm, Lm	FACU	20
	Arrowwood viburnum	*Viburnum dentatum*	B, Sm, Lm	FAC	20
	Blueberry	*Vaccinium corymbosum*	B, Sm, Lm	FACU	20
	Button bush	*Cephalanthus occidentalis*	B, Sm, Lm	OBL	40
	Dog hobble	*Leucothoe fontanesiana*	Sm	FAC	20
	Eastern sweetshrub	*Calycanthus floridus*	Lm	FACU	20
	Elderberry	*Sambucus canadensis*	B, Sm, Lm	FACW	40
	Flame azalea	*Rhododendron calendulaceum*	B	FACU	20
	Maple leaf viburnum	*Viburnum acerifolium*	B	FACU	20
	Pawpaw	*Asimina triloba*	B, Sm,	FAC	20
	Possum haw	*Ilex decidua*	B, Sm,	FACW	20
	Red chokeberry	*Aronia arbutifolia*	B, Sm, Lm	FACW	40
	Rhododendron	*Rhododendron maximum*	B, Sm, Lm	FACU	20
	Spicebush	*Lindera benzoin*	B	FACW	20
	Sweet azalea	*Rhododendron arborescens*	B, Lm	FACW	20
	Tag alder	*Alnus serrulata*	B	FACW	20
	Virginia sweetspire	*Itea virginica*	B, Lm	FACW	20
	Winterberry	*Ilex verticillata*	B, Sm	FACW	20
	Witch hazel	*Hamamelis virginiana*	B, Sm, Lm	FACU	20
	Yellow root	*Xanthorhiza simplicissima*	B	FACW	20
Totals	20				420
Medium trees	Alleghany serviceberry	*Amelanchier laevis*	B	FACU	20
	American holly	*Ilex opaca*	B, Sm	FACU	20
	American hornbeam	*Carpinus caroliniana*	B, Sm	FAC	20
	American mountain ash	*Sorbus americana*	B, Sm, Lm	FACU	20
	Black cherry	*Prunus serotina*	B, Sm	FACU	20, 100
	Black willow	*Salix nigra*	B, Sm, Lm	OBL	20
	Crabapple	*Malus angustifolia*	B, Sm, Lm	FACU	100
	Dogwood	*Cornus florida*	B, Sm	FACU	100
	Eastern redbud	*Cercis canadensis*	B	FACU	100
	Ironwood	*Ostrya virginiana*	B, Sm	FACU	20
	Persimmon	*Diospyrus virginiana*	B, Sm, Lm	FACU	20, 100
	River birch	*Betula nigra*	B	FACW	20, 100
	Sourwood	*Oxydendrum arboreum*	B	FACU	100
	Wild plum	*Prunus americana*	B, Sm, Lm	FACU	200
Totals	14				1,000
Large trees	American beech	*Fagus grandifolia*	B, Sm, Lm	FACU	20
	Black gum	*Nyssa sylvatica*	B, Sm, Lm	FAC	100
	Mockernut hickory	*Carya tomentosa*	B, Sm, Lm	FACU	100
	Northern red oak	*Quercus rubra*	B, Sm, Lm	FACU	20, 100
	Pignut hickory	*Carya glabra*	B, Sm, Lm	FACU	100
	Scarlet oak	*Quercus coccinea*	B, Sm, Lm	FACU	200
	Sycamore	*Platanus occidentalis*	B, Sm	FACW	200
	White oak	*Quercus alba*	B, Sm, Lm	FACU	20, 100
	Yellow buckeye	*Aesculus octandra*	B, Sm, Lm	FAC	40
Totals	9				980

Figure F.1 Proposed Construction Drawings for the Upper South Hominy Mitigation Site.

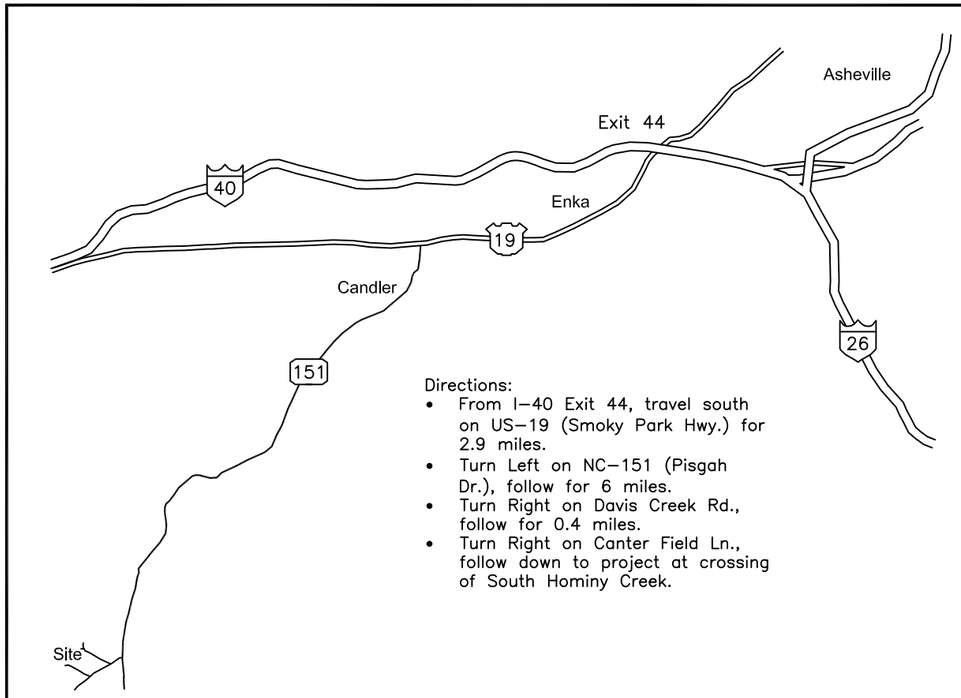
NC ECOSYSTEM ENHANCEMENT PROGRAM
&
NC WILDLIFE RESOURCES COMMISSION

SOUTH HOMINY CREEK MITIGATION PROJECT

PRESERVATION, ENHANCEMENT & RESTORATION

BUNCOMBE COUNTY, NORTH CAROLINA

INDEX OF SHEETS



Directions:
- From I–40 Exit 44, travel south on US–19 (Smoky Park Hwy.) for 2.9 miles.
- Turn Left on NC–151 (Pisgah Dr.), follow for 6 miles.
- Turn Right on Davis Creek Rd., follow for 0.4 miles.
- Turn Right on Canter Field Ln., follow down to project at crossing of South Hominy Creek.

SITE LOCATION MAP
NO SCALE

DATUM DESCRIPTION:

HORIZONTAL AND VERTICAL DATUMS ARE BASED ON NCGS NAD 83. CONTROL POINTS WERE ESTABLISHED DURING RTK/GPS SURVEY OF 10/09.

NCWRC STAFF WILL BE ON SITE TO SET NECESSARY CONTROL POINTS AND TO VERIFY LOCATIONS AND ELEVATIONS DURING GRADING & CONSTRUCTION.

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

TITLE, SITE LOCATION & INDEX

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

Project No.: 92632
Date: 13-DEC-10
File Name: ush base.dwg
Surveyed: JCF,CSL,ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD
Sheet No. 1 of 25

South Hominy Creek
- Reach 1,4,6 & 8
  - Restoration (Priority 3)
  - Total Length: 1,077LF
- Reach 9
  - Enhancement I
  - Total Length: 500LF
- Reach 2,3,5,7 & 10
  - Enhancement II
  - Total Length: 1,163LF

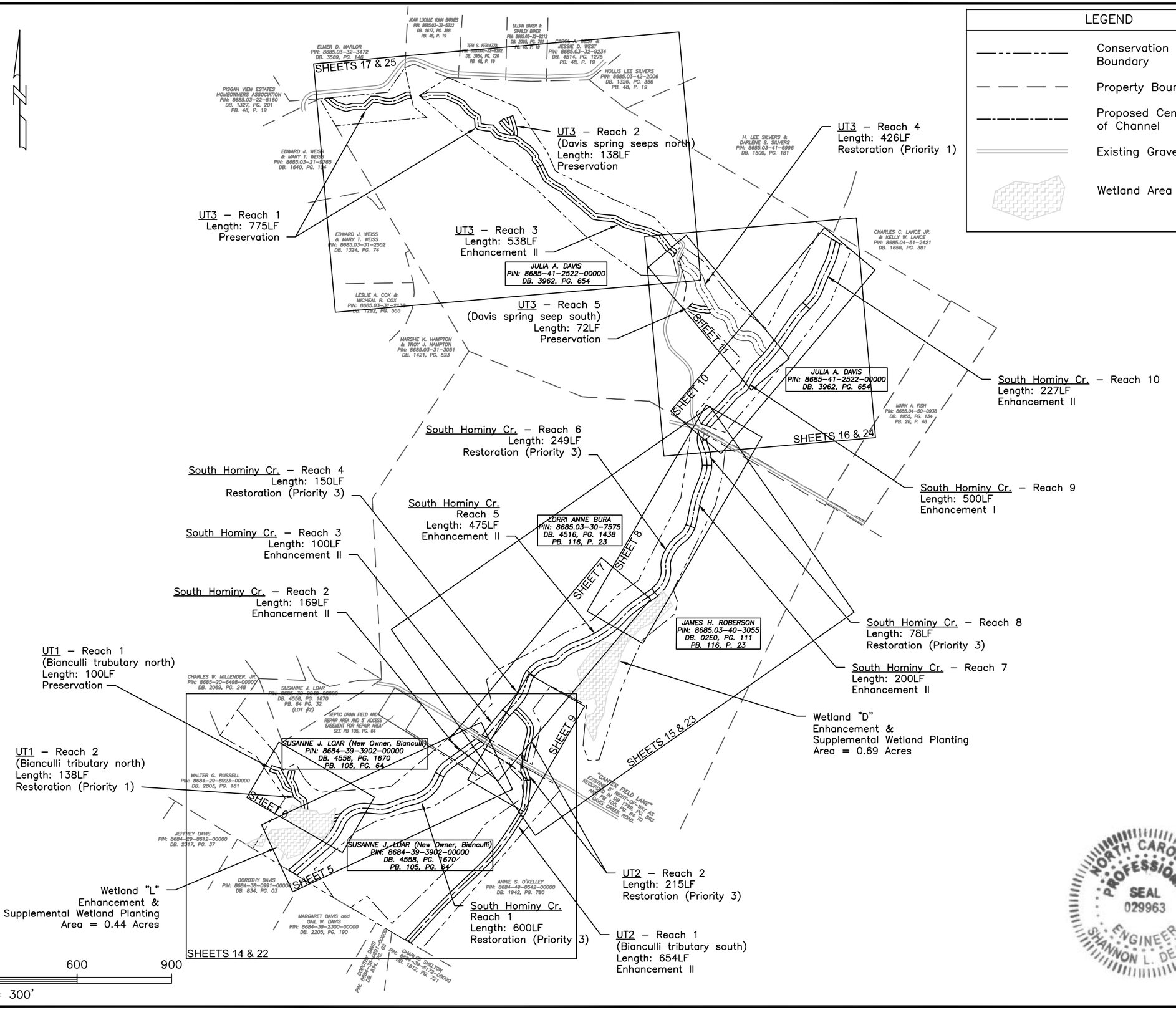
UT1
- Reach 1
  - Preservation
  - Total Length: 100LF
- Reach 2
  - Restoration (Priority 1)
  - Total Length: 138LF

Wetland (Area "L")
- Wetland Enhancement & Supplemental Wetland Planting
- Total Area: 0.44Ac.

UT2
- Reach 1
  - Enhancement II
  - Total Length: 654LF
- Reach 2
  - Restoration (Priority 3)
  - Total Length: 215LF

Wetland (Area "D")
- Wetland Enhancement & Supplemental Wetland Planting
- Total Area: 0.69Ac.

UT3
- Reach 1
  - Preservation
  - Total Length: 775LF
- Reach 2
  - Preservation
  - Total Length: 138LF
- Reach 3
  - Enhancement II
  - Total Length: 538LF
- Reach 4
  - Restoration (Priority 1)
  - Length: 426LF
- Reach 5
  - Preservation
  - Total Length: 72LF



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Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

OVERALL PLAN & SHEET MATCH LINES

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

Project No.	92632
Date:	13-DEC-10
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Surveyed:	JCF,CSL,ABB
Designed:	JCF,CSL
Drawn:	JCF
Approved:	SLD
Sheet No.	2 of 25

NCWRC Responsibilities

1. Provide Mitigation Plans to NCEEP and direct implementation of plan by supervising construction.
2. Obtain USACE 404, NCDWQ 401, NCDLQ erosion and sedimentation control, and trout buffer waiver approvals for this project.
3. Provide erosion control materials and confirm that they are stockpiled at the work site prior to the startup date.
4. Maintain a daily log of hours worked, the linear footage of stream completed and notes of other activities taking place each day. Contractor or his representative should sign this log each day.
5. Locate any underground utilities and mark locations prior to ground disturbing activities.
6. Be on site while contractor is working to guide work. Construction is anticipated to be completed within 90 days of the start date.
7. Provide thorough photo documentation of access roads, bridges, buildings adjacent to project area (i.e., everything outside the conservation easement) prior to any construction activity. Private bridge crossings on Canter Field lane and Connie Davis Road will be avoided completely by all construction traffic during the extent of the project.
8. Following completion of construction, the conservation easement boundary will be marked. Where livestock fencing coincides with the conservation easement boundary signage (provided by NCEEP) will be attached to fence posts every 50–100 ft. Where there is no fencing installed along the boundary, metal T–posts will be erected at every conservation easement cap (turn) and marked with signage. Additional metal T–posts will be erected in between the easement caps when the distance between caps is greater than 100 ft or when terrain or line of sight warrant additional marking to clearly signify the easement boundary.

Contractors Construction Sequence

1. Contractor should use the first day to move equipment on the project site along routes designated by the NCWRC.
2. Access to the site will be from Connie Davis Road and Canter Field Lane. All damage or impacts to access roads will be repaired immediately if it poses a risk to water quality or at the request of the project manager. The private bridge on Canter Field Lane and Connie Davis Drive are to be avoided completely by all construction traffic; all project traffic will be required to utilize the stream ford crossing. The bridges are to remain open for private residents use only.
3. NCWRC will walk through the entire project site with the contractor.
4. Removal of any beaver dams may be requested during construction at the discretion of the NCWRC.
5. Delineate, clear, and haul stone to prepare construction access roads on site. The construction entrances and access lanes shall be maintained to the specifications of the detail. All public roads shall be kept free of mud and debris. Existing drives and entrances shall be returned to the pre–existing condition prior to equipment demobilization.
6. Establish high ground spoil areas at the upper and lower reaches of the project site. Upper spoil area to be located on the right bank of the Bianculli property in the pasture. Lower spoil area to be located on the left bank of the Davis property in the pasture.
7. Install erosion control practices around material staging and spoil areas.
8. Haul rock to the site for building stream structures. Rock will staged adjacent to structure installation locations.
9. Remove non–native vegetation within the conservation easement area. Salvage and heel–in native trees and shrubs that can be re–planted. Salvage and stockpile larger trees for log vane and root–wad structures.
10. All woody waste material will be burned on–site in accordance with local regulations.
11. Cover disturbed ground with seed mixes, fertilizer, straw, coir or jute matting by the end of each work day.
12. The construction sequence will begin at the upper portion of the project reach on the Bianculli property. The Bianculli tributary north (UT1) will be worked first. A new channel will be constructed in the woodland area. The existing entrenched channel will be backfilled with material formerly dredged from the existing channel and with spoil material from construction of the new UT1 channel.
13. Beginning at the upper most segment of SHC on the Bianculli property, Excavate floodplain benches and shape channel banks to design elevations. Slope from the back of the bankfull benches to existing ground elevation not to exceed 1:1. Earthwork shall be staged such that no more channel banks will be disturbed than can be stabilized by the end of the work day.
14. Construct J–hook rock and log vanes and root–wad structures at locations shown on the design drawings when these stations are reached in the clearing, excavation, and bank shaping process.
15. Remove all non–native vegetation within the conservation easement area along the Bianculli tributary south (UT2). Removal of non–native vegetation on UT2 shall be accomplished by mechanized removal when reachable from dry ground; however, a portion of the unwanted vegetation will be removed by hand to prevent damage to channel and wetland areas associated with the tributary. Lower most portion of UT2 will be placed back into its original channel alignment by channeling the flow under the Canter Field Lane driveway. A properly sized culvert will be placed under the driveway and flow established to the previously abandoned channel on the Roberson property.
16. Begin excavation of floodplain benches and shape channel banks on the Roberson and Bura segment of the SHC. Construct J–hook rock and log vanes and root–wad structures at locations shown on the design drawings when these stations are reached in the clearing, excavation, and bank shaping process. Connect UT2 and Roberson wetland "D" to mainstem of SHC when the areas are reached in the process of working downstream on SHC. Removal of non–native vegetation on UT2 shall be accomplished by mechanized removal from dry ground; however, the majority of the unwanted vegetation will be removed by hand to prevent damage to channel and wetland areas associated with the tributary. Complete any final floodplain and bank shaping before moving equipment to next targeted channel segment, replant salvaged trees and shrubs, cover any remaining disturbed areas with temporary and permanent seed mix, straw mulch, and matting.
17. Begin excavation of floodplain benches and shaping channel banks on the Davis segment of SHC starting just downstream of the Davis bridge. Construct J–hook rock and log vanes and root–wad structures at locations shown on the design drawings when these stations are reached in the clearing, excavation, and bank shaping process. Transition construction activities from SHC to the upper portion of the Davis unnamed tributary (UT3) before lower portion of SHC clearing and grading is completed. Remove all non–native vegetation from the within the conservation easement along the upper segment of UT3 and shape channel banks where indicated. Remove corner blocks of old chicken house that is encroaching in the conservation easement and pile material in center of the old chicken house. Use sand bags to construct temporary coffer dam to collect flow and pipe water to Davis spring seep (south). Construct in the dry the step–pool rock feature in gully below UT3 wet ford. Construct Priority 1 channel beginning just downstream from confluence with Davis spring seep (south) and ending at mouth of UT3. Resume floodplain benching and bank shaping on lower portion of the Davis SHC reach. Construct J–hook rock and log vanes and root–wad structures at locations shown on the design drawings when these stations are reached in the clearing, excavation, and bank shaping process.
18. Complete any final floodplain and bank shaping before removing equipment, replant salvaged trees and shrubs, cover any remaining disturbed areas with temporary and permanent seed mix, straw mulch, and matting.
19. Finish grade spoil and construction staging areas and cover with seed and straw mulch.
20. Inspect and add any needed erosion control measures.
21. Remove all unused construction materials, including any trash or waste, from project site.
22. Erosion control structures will be checked weekly and after every significant rainfall event while the project proceeds to insure proper function. Regular inspections will continue and modifications made after project completion or until permanent vegetation is established. Any needed maintenance or repair will be made by the NCWRC immediately after the inspection and no later than 5 days after determination is made.
23. The NCWRC and the contractor will make a final inspection to insure that the project is complete before equipment is removed from the site. Construction is anticipated to be completed within 90 days of the start date.
24. After the final inspection and NCWRC approval of construction, equipment will be removed along approved routes on the final day.

LEGEND

- CONSERVATION EASEMENT BOUNDARY
- EXISTING THALWEG
- EXISTING THALWEG (SPRINGS)
- EXISTING GRAVEL DRIVE
- FENCING
- PROPOSED CENTER LINE OF CHANNEL
- DELINEATED WETLAND
- E&S TRAVEL CORRIDOR
- SF — SF — E&S SEDIMENT (SILT) FENCE
- LOD — E&S LIMIT OF DISTURBANCE
- E&S TEMPORARY CONSTRUCTION ENTRANCE
- T — E&S TEMPORARY CHANNEL CROSSING
- E&S TEMPORARY IMPERVIOUS DIKE
- CULVERT
- ROCK LINED OUTLET
- ROCK CROSS VANE
- ROCK J–HOOK
- LOG VANE
- ROOT WAD
- BOULDER STEP
- LOG STEP

PLANTING ZONES

- ZONE 1: Stream Bank & Channel Planting
- ZONE 2: Floodplain Planting
- ZONE 3: Transition/Upland Planting
- ZONE 4: Wetland Enhancement Planting
- ESTABLISHED RIPARIAN BUFFER: Invasive Vegetation Removal Minimal Planting
- OTHER DISTURBED AREAS: Seeded & Mulched

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

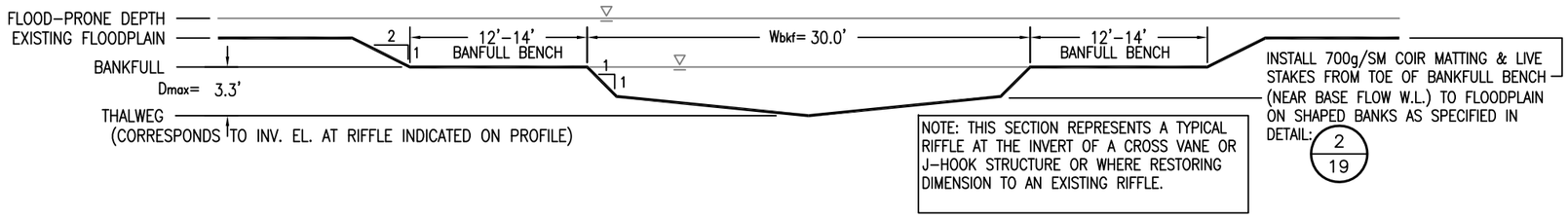
SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

CONSTRUCTION SEQUENCE & LEGEND OF SYMBOLS

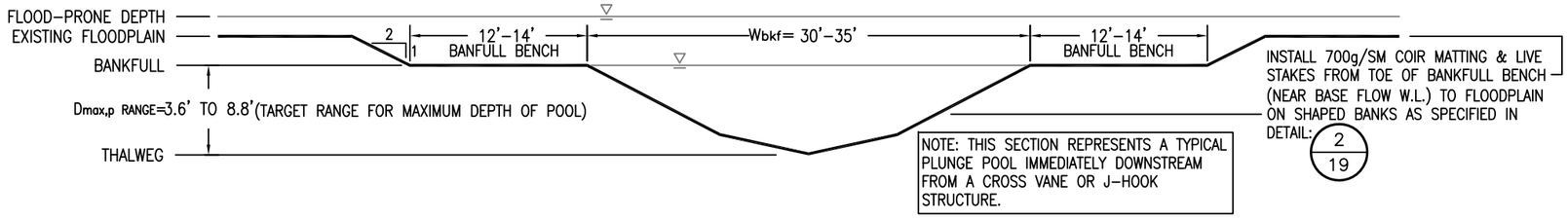
Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

Project No. 92632
Date: 13-DEC-10
File Name: ush base.dwg
Surveyed: JCF,CSL,ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD
Sheet No. 3 of 25

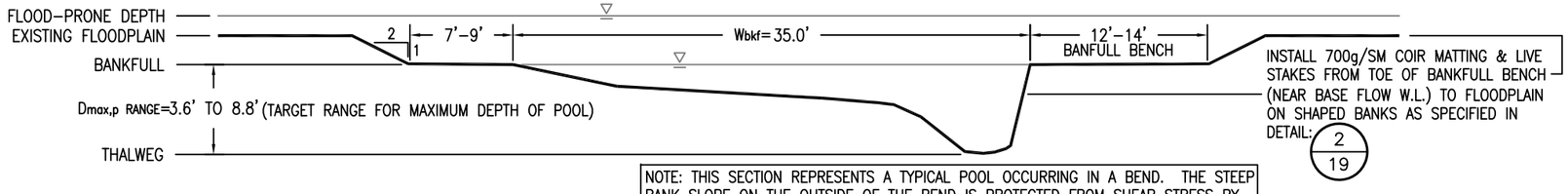
NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES. LOCATIONS AND ELEVATIONS OF STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.



SOUTH HOMINY CREEK (ALL REACHES): TYPICAL RIFFLE CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'



SOUTH HOMINY CREEK (ALL REACHES): TYPICAL PLUNGE POOL CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'



SOUTH HOMINY CREEK (ALL REACHES): TYPICAL BEND POOL CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'

10 0 10 20
Scale: 1" = 10'

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

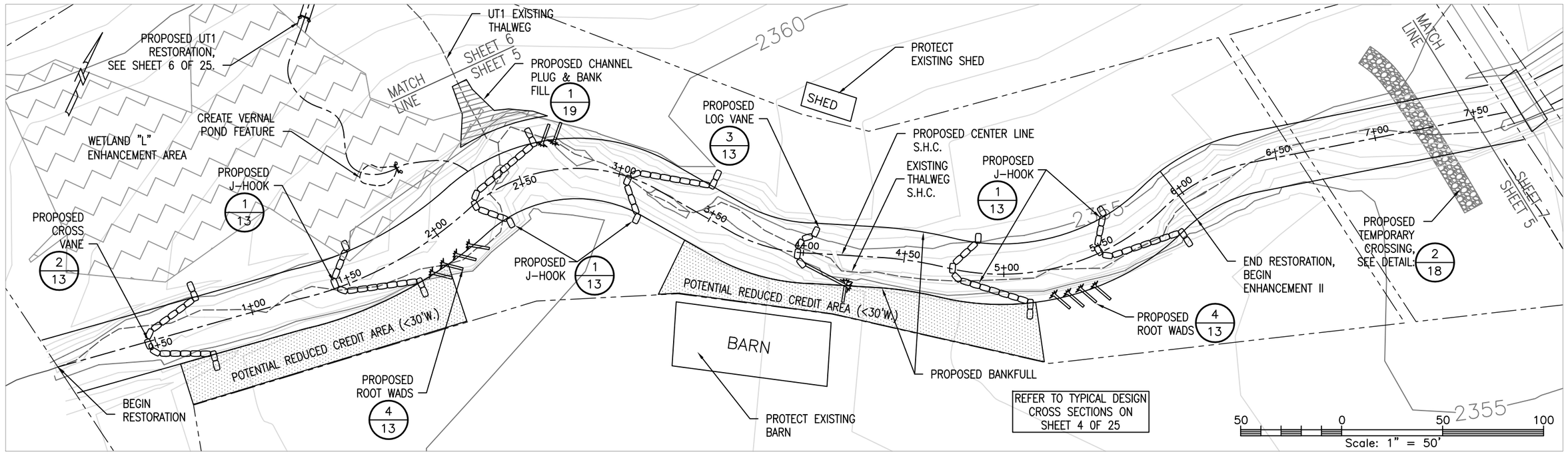
North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

South Hominy Creek
Restoration (All Reaches)
Typical Cross Sections

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

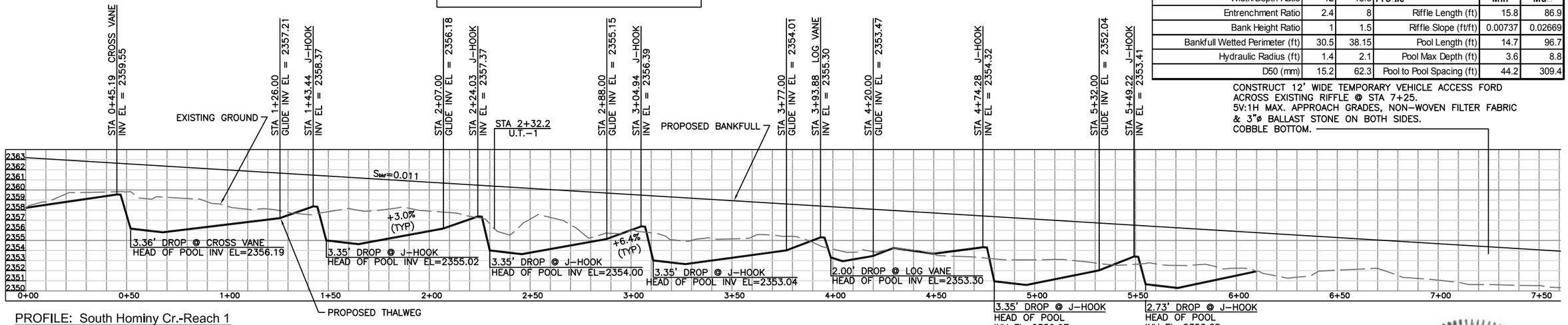
Project No. 92632
Date: 13-DEC-10
File Name: ush base.dwg
Surveyed: JCF,CSL, ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD
Sheet No. 4 of 25



PLAN: SOUTH HOMINY CREEK
BIANCULLI SECTION (STA 0+00 - 7+69)
Scale: 1" = 50'

NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES.
STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.

South Hominy Creek Design Data (Type: C)					
Dimension	**Min**	**Ma**	**Pattern**	**Min**	**Ma**
Bankfull Width (ft)	28.1	37.2	Channel Belt Width (ft)	53.1	256.2
Floodprone Width (ft)	68.4	296	Radius of Curvature (ft)	10.7	256.2
Bankfull Cross-Sectional Area (ft2)	43.8	75.5	Rc:Bankfull Width (ft/ft)	0.4	6.9
Bankfull Mean Depth (ft)	1.5	2.2	Meander Wavelength (ft)	108	469.8
Bankfull Max Depth (ft)	2	3.3	Meander Width Ratio	1.9	6.9
Width/Depth Ratio	12	18.6	**Profile**	**Min**	**Ma**
Entrenchment Ratio	2.4	8	Riffle Length (ft)	15.8	86.9
Bank Height Ratio	1	1.5	Riffle Slope (ft/ft)	0.00737	0.02669
Bankfull Wetted Perimeter (ft)	30.5	38.15	Pool Length (ft)	14.7	96.7
Hydraulic Radius (ft)	1.4	2.1	Pool Max Depth (ft)	3.6	8.8
D50 (mm)	15.2	62.3	Pool to Pool Spacing (ft)	44.2	309.4



CONSTRUCT 12' WIDE TEMPORARY VEHICLE ACCESS FORD ACROSS EXISTING RIFFLE @ STA 7+25.
5V:1H MAX. APPROACH GRADES, NON-WOVEN FILTER FABRIC & 3"ø BALLAST STONE ON BOTH SIDES.
COBBLE BOTTOM.

PROFILE: South Hominy Cr.-Reach 1
Scale: H: 1" = 50'
V: 1" = 10'

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
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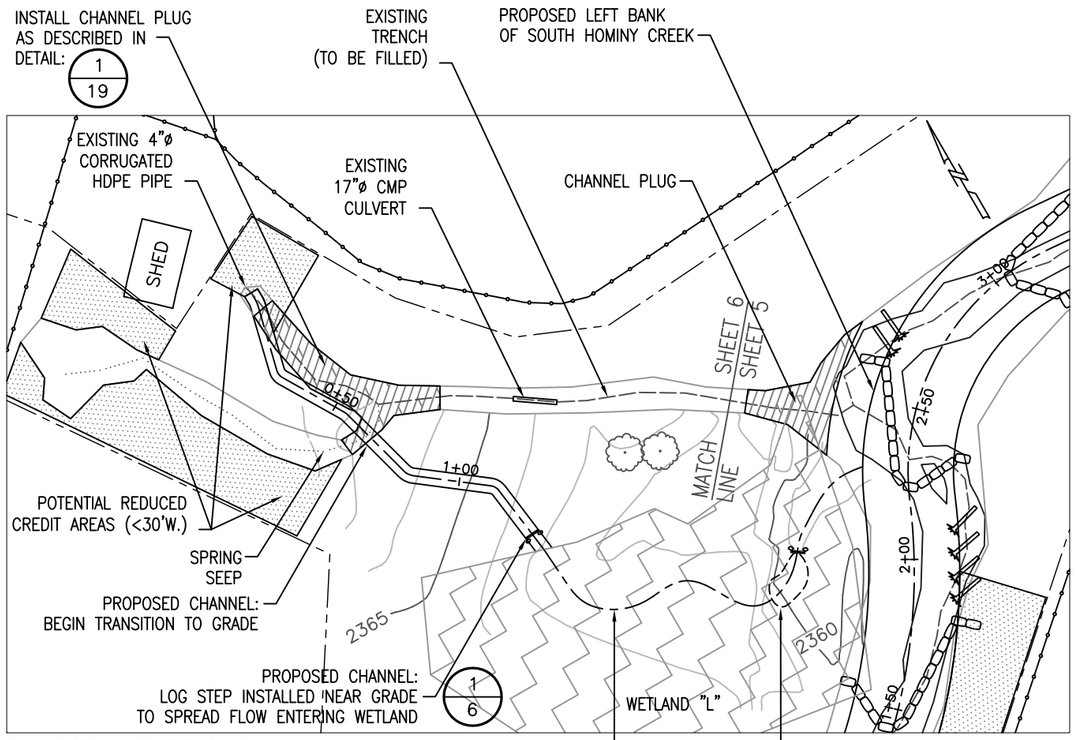
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

South Hominy Creek (Bianculli Site)
Restoration of Reach 1
Plan & Profile

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

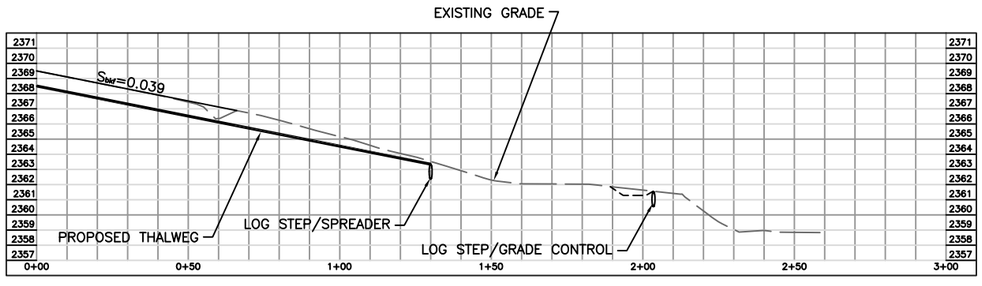
Project No. 92632
Date: 13-DEC-10
File Name: ush base.dwg
Surveyed: JCF,CSL, ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD
Sheet No. 5 of 25



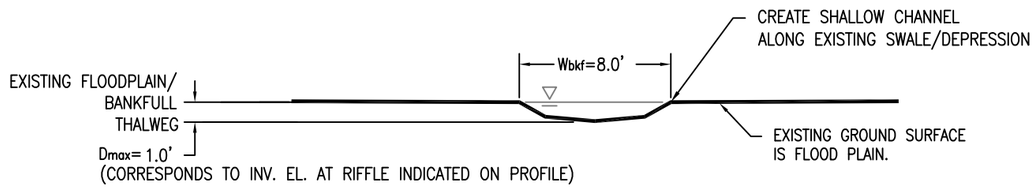
PLAN VIEW: UT1-REACH 2
Scale: 1" = 50'

NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES.
STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.

50 0 50 100
Scale: 1" = 50'



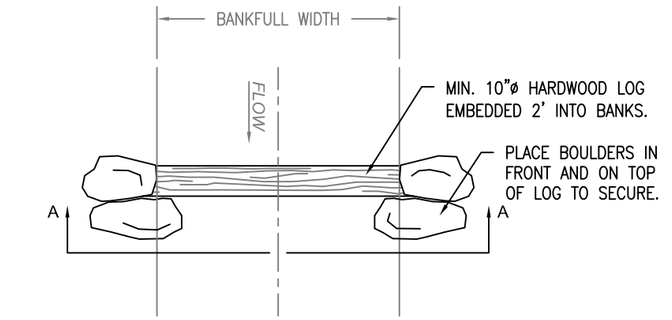
PROFILE: UT1-REACH 2
Scale: H: 1" = 50'
V: 1" = 10'



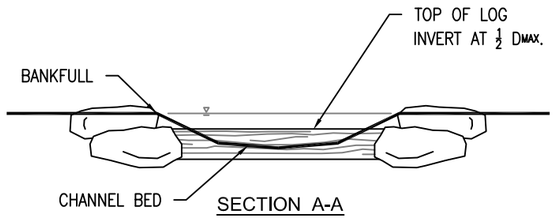
TYPICAL RIFFLE CROSS SECTION - UT1 REACH 2
NO SCALE

CONSTRUCTION SEQUENCE – UT1 TO WETLAND "L":

1. RESTORATION OF LEFT BANK OF SOUTH HOMINY CREEK SHOULD BE COMPLETE TO A POINT DOWNSTREAM OF THE PROPOSED DISCHARGE FROM WETLAND AREA FED BY RESTORATION OF UT1.
2. REMOVE DEBRIS AND INVASIVE VEGETATION FROM THE EXISTING DRAINAGE TRENCH. CROSS TRENCH AT EXISTING CULVERT WHEN NECESSARY.
3. USE A SMALL, RUBBER TRACKED EXCAVATOR TO LAY IN SWALE FROM STA. 0+66 TO 1+33. INSTALL LOG STEP STRUCTURE WHERE INDICATED TO SPREAD FLOW ENTERING WETLAND AREA.
4. REMOVE CLUSTER OF MAPLES NEAR TERRACE OF SOUTH HOMINY CREEK TO CREATE A SMALL PONDING AREA BEFORE FLOW DROPS. INSTALL LOG STEP WHERE SHOWN TO MAINTAIN GRADE.
5. IF THERE IS FLOW FROM THE EXISTING 4"ø CORRUGATED PLASTIC PIPE AT THE HEAD OF THE TRENCH, CONNECT A TEMPORARY SLOPE DRAIN PIPE TO DIVERT FLOW TO THE NEW SWALE AT STA. 1+00.
6. INSTALL CHANNEL PLUGS WHERE INDICATED.
7. SHAPE PROPOSED UPPER SECTION OF UT1 CHANNEL. STABILIZE BANKS & BED.
8. REMOVE DIVERSION PIPE TO CONNECT FLOW TO NEW CHANNEL.
9. FILL ABANDONED TRENCH WITH COMPACTED SPOIL FROM SOUTH HOMINY CREEK RESTORATION.
10. SEED & MULCH ALL DISTURBED AREAS.



PLAN VIEW



SECTION A-A

1/6 LOG STEP DETAIL
NO SCALE

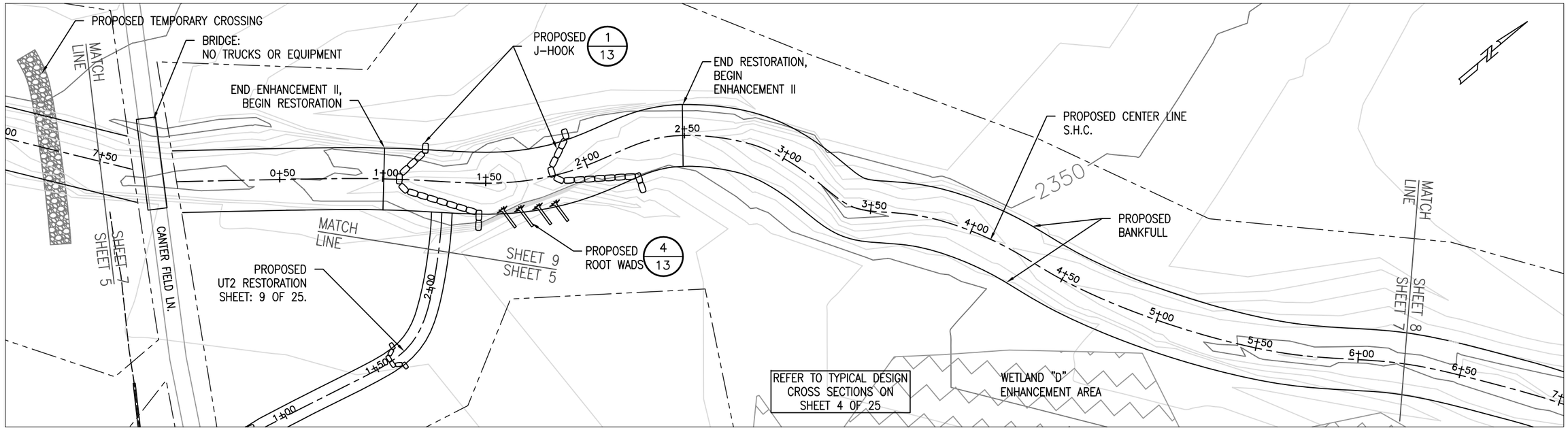
North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC
Restoration of UT1 - Reach 2
to South Hominy Ceek (Bianculli Site)
Plan, Profile & Details

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

Project No. 92632
Date: 13-DEC-10
File Name: ush base.dwg
Surveyed: JCF,CSL,ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD
Sheet No. 6 of 25

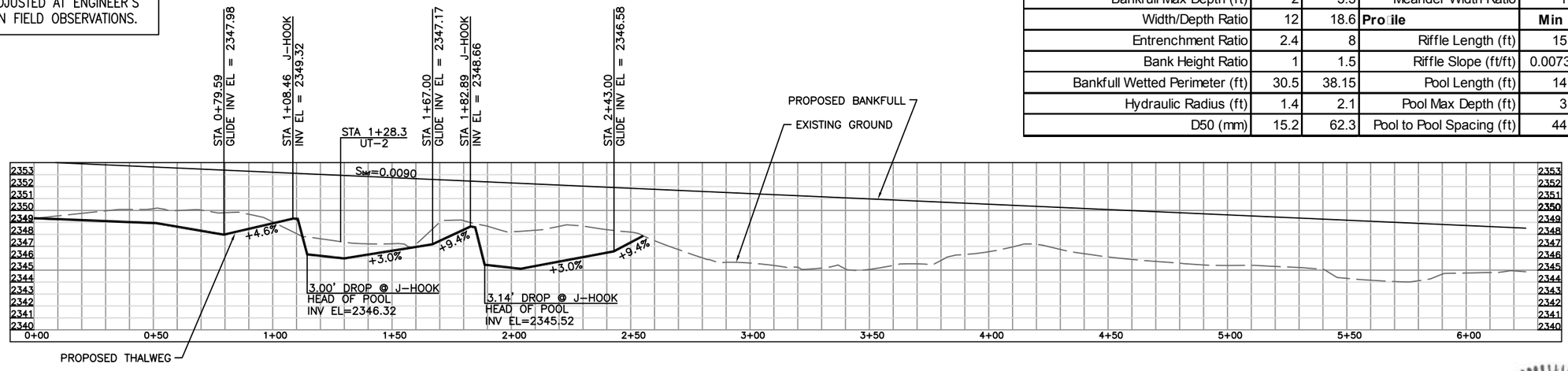


PLAN: SOUTH HOMINY CREEK
BURA/ROBERSON SECTION (STA 0+00 - 6+25)
Scale: 1" = 50'

50 0 50 100
Scale: 1" = 50'

NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES.
STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.

South Hominy Creek Design Data (Type: C)					
Dimension	**Min**	**Ma**	**Pattern**	**Min**	**Ma**
Bankfull Width (ft)	28.1	37.2	Channel Belt Width (ft)	53.1	256.2
Floodprone Width (ft)	68.4	296	Radius of Curvature (ft)	10.7	256.2
Bankfull Cross-Sectional Area (ft2)	43.8	75.5	Rc:Bankfull Width (ft/ft)	0.4	6.9
Bankfull Mean Depth (ft)	1.5	2.2	Meander Wavelength (ft)	108	469.8
Bankfull Max Depth (ft)	2	3.3	Meander Width Ratio	1.9	6.9
Width/Depth Ratio	12	18.6	**Profile**	**Min**	**Ma**
Entrenchment Ratio	2.4	8	Riffle Length (ft)	15.8	86.9
Bank Height Ratio	1	1.5	Riffle Slope (ft/ft)	0.00737	0.02669
Bankfull Wetted Perimeter (ft)	30.5	38.15	Pool Length (ft)	14.7	96.7
Hydraulic Radius (ft)	1.4	2.1	Pool Max Depth (ft)	3.6	8.8
D50 (mm)	15.2	62.3	Pool to Pool Spacing (ft)	44.2	309.4



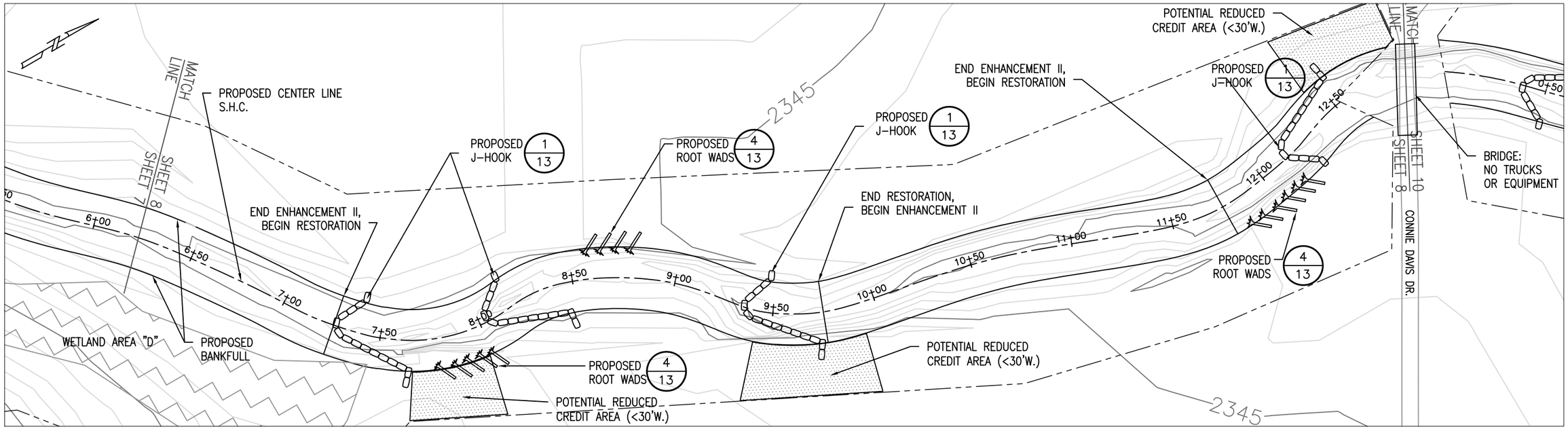
PROFILE: SOUTH HOMINY CREEK
BURA/ROBERSON SECTION (STA 0+00 - 6+25)
Scale: H: 1" = 50'
V: 1" = 10'

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC
South Hominy Cr. - Bura/Roberson Site
(Sta. 0+00-6+25)
Reach 4 Restoration - Plan & Profile

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

Project No. 92632
Date: 13-DEC-10
File Name: ush base.dwg
Surveyed: JCF,CSL,ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD
Sheet No. 7 of 25



PLAN: SOUTH HOMINY CREEK
BURA/ROBERSON SECTION (STA 6+25 - 12+50)
Scale: 1" = 50'

50 0 50 100
Scale: 1" = 50'

NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES. STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.

South Hominy Creek Design Data (Type: C)					
Dimension	**Min**	**Ma**	**Pattern**	**Min**	**Ma**
Bankfull Width (ft)	28.1	37.2	Channel Belt Width (ft)	53.1	256.2
Floodprone Width (ft)	68.4	296	Radius of Curvature (ft)	10.7	256.2
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Width/Depth Ratio	12	18.6	**Pro ile**	**Min**	**Ma**
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Bank Height Ratio	1	1.5	Riffle Slope (ft/ft)	0.00737	0.02669
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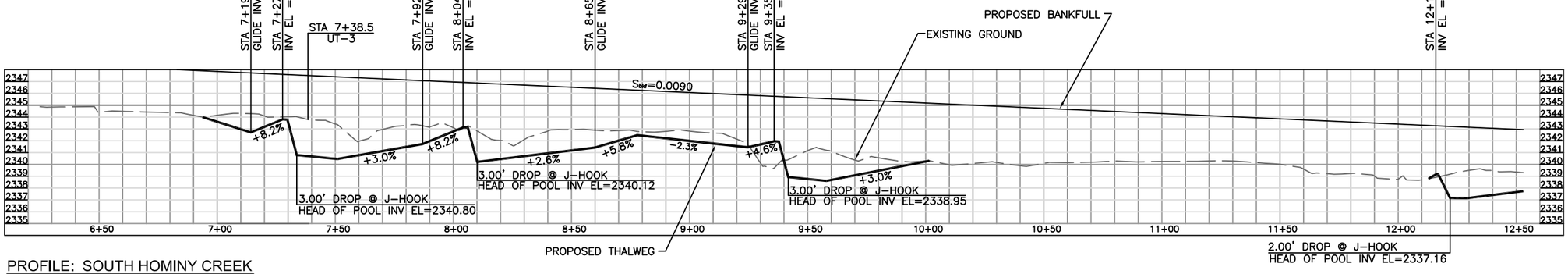
Hydraulic Radius (ft)	1.4	2.1	Pool Max Depth (ft)	3.6	8.8
D50 (mm)	15.2	62.3	Pool to Pool Spacing (ft)	44.2	309.4

REFER TO TYPICAL DESIGN CROSS SECTIONS ON SHEET 4 OF 25



PROFILE: SOUTH HOMINY CREEK
BURA/ROBERSON SECTION (STA 6+25 - 12+50)
Scale: H: 1" = 50'
V: 1" = 10'

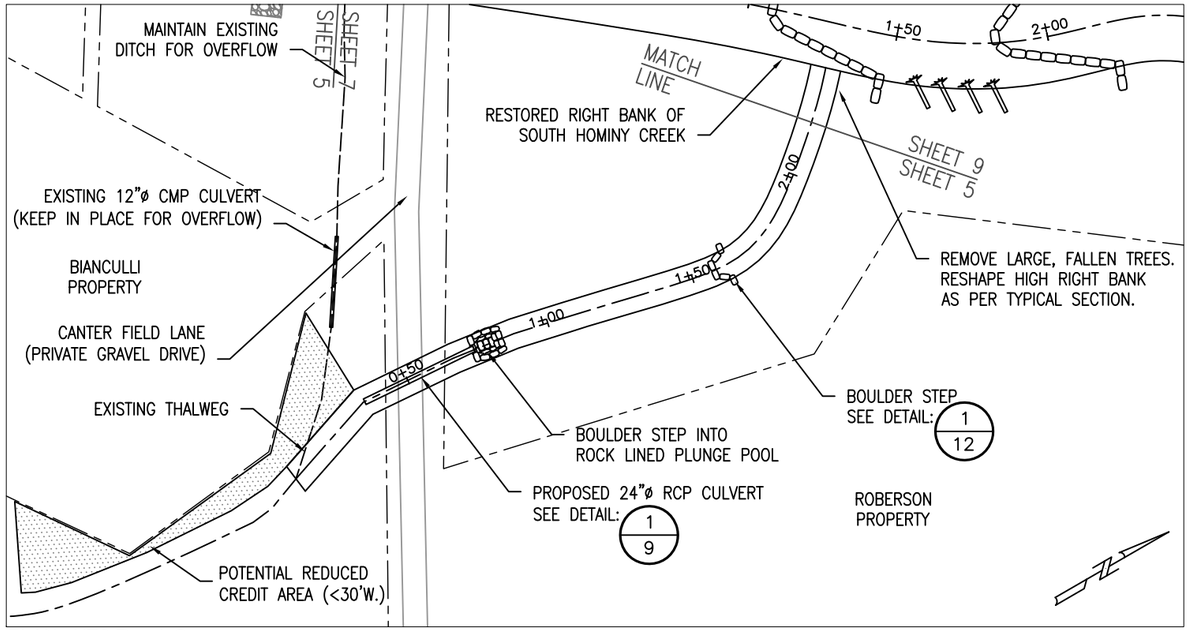
North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

South Hominy Creek - Bura/Roberson Site
(Sta. 6+25-12+50)
Reach 6 & 8 Restoration Plan & Profile

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

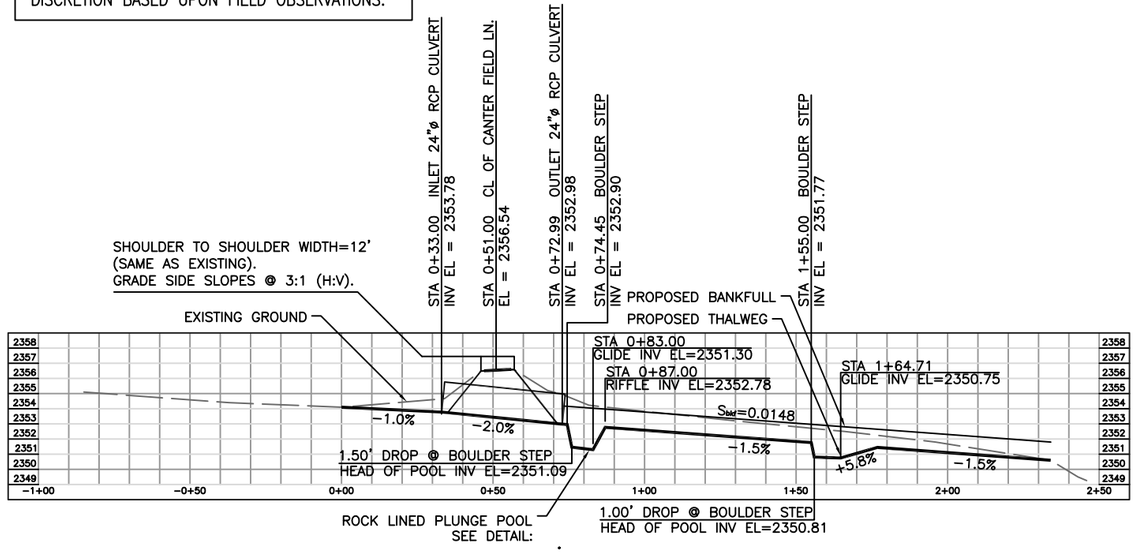
Project No. 92632
Date: 07-DEC-10
File Name: ush base.dwg
Surveyed: JCF, CSL, ABB
Designed: JCF, CSL
Drawn: JCF
Approved: SLD
Sheet No. 8 of 25



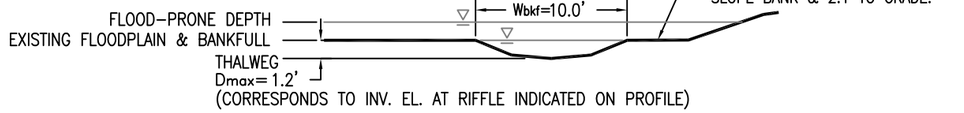
PLAN: UT2-Reach 2
Scale: 1" = 50'

50 0 50 100
Scale: 1" = 50'

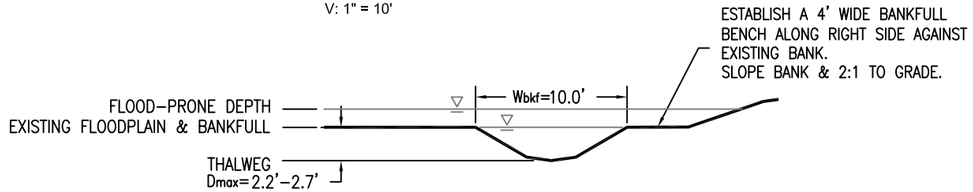
NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES.
STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.



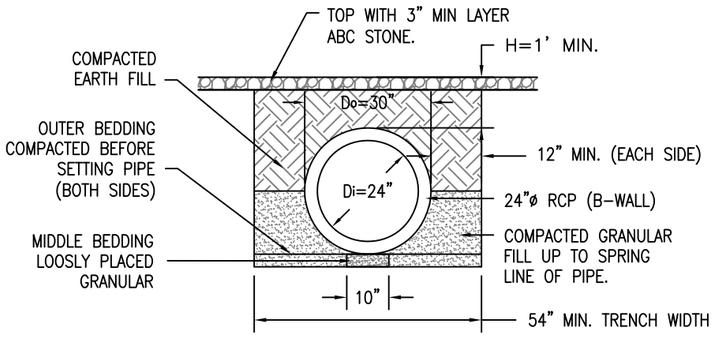
PROFILE: UT2-REACH 2
Scale: H: 1" = 50'
V: 1" = 10'



UT2-REACH 2: TYPICAL RIFFLE CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'

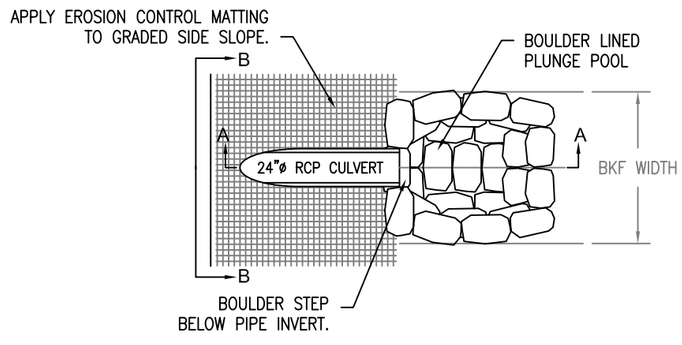


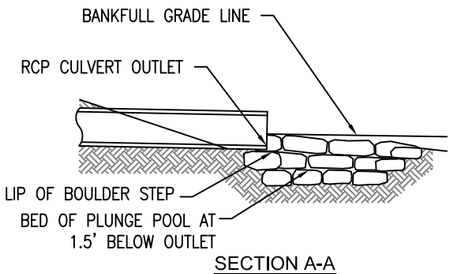
UT2-REACH 2: TYPICAL POOL CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'



SECTION B-B

NOTES:
1. PIPE SHALL BE 24"I.D. ROUND, B-WALL REINFORCED CONCRETE CULVERT PIPE MEETING ASTM C-76.
2. GRANULAR BEDDING SHALL BE SAND, GRAVEL FINES OR ABC STONE.
3. BEGIN PLACING PIPE FROM OUTLET W/ BELL ENDS FACING TOWARD INLET.
4. PLACE MIN. 3" BED OF GRANULAR MATERIAL IN GRADED TRENCH. COMPACT OUTER BEDDING W/ PLATE COMPACTOR.
5. PLACE GRANULAR HAUNCH FILL IN COMPACTED 6" LIFTS TO SPRING LINE OF PIPE.
6. PLACE CLEAN, SELECT, UNIFORM EARTH FILL IN COMPACTED 6" LIFTS TO SUBGRADE.
7. TOP W/ MIN. 3" LAYER OF ABC STONE.





SECTION A-A

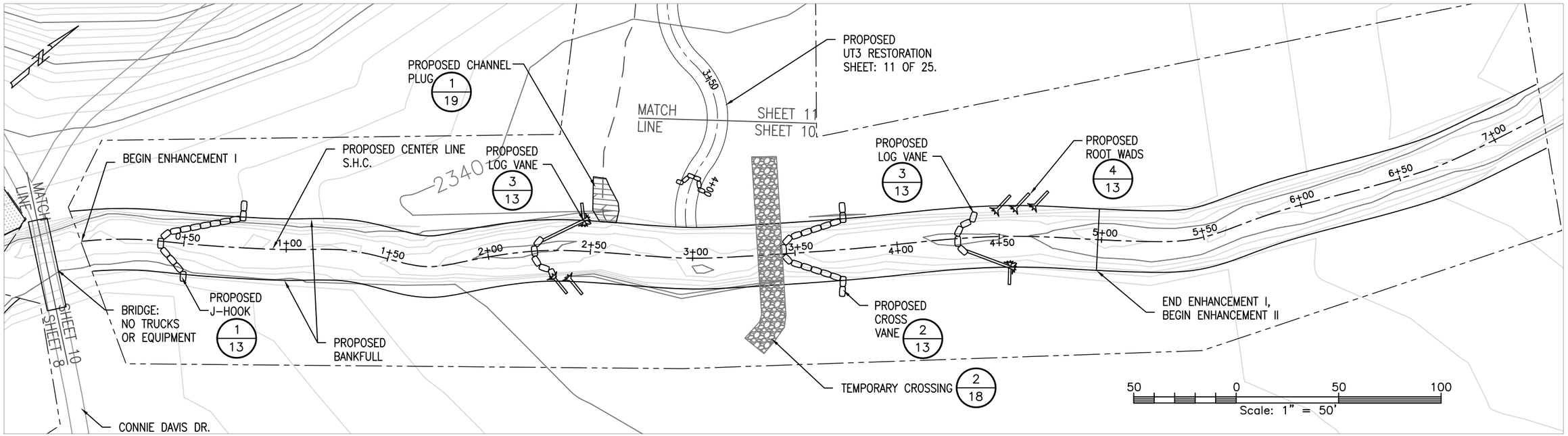
1/9 CULVERT INSTALLATION DETAIL
NO SCALE

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
Waynesville, North Carolina 28786
Phone: 828.452.6191 Ext. 26
Fax: 828.452.7772
www.ncwildlife.org

SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC
UT2 to South Hominy Ceek
(Roberson Site)
Restoration Plan, Profile & Details

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

Project No. 92632
Date: 13-DEC-10
File Name: ush base.dwg
Surveyed: JCF,CSL,ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD
Sheet No. 9 of 25



PLAN: SOUTH HOMINY CREEK
DAVIS SECTION (STA. 0+00-7+27)
Scale: 1" = 50'

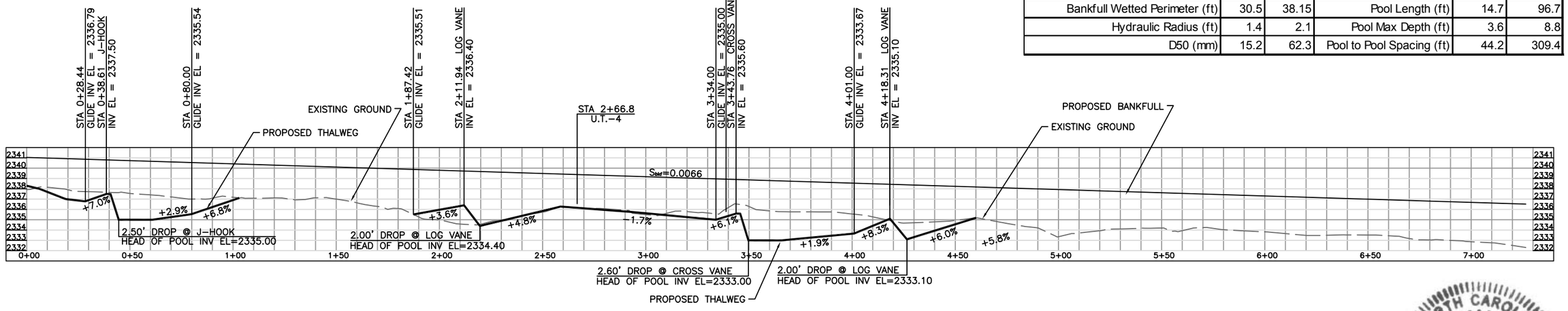
NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES.
STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.

REFER TO TYPICAL DESIGN CROSS SECTIONS ON SHEET 4 OF 25

CONSTRUCT 12' WIDE TEMPORARY VEHICLE ACCESS FORD ACROSS EXISTING RIFFLE @ STA 3+38.
10% APPROACH GRADES, NON-WOVEN FILTER FABRIC & 3"ø BALLAST STONE ON BOTH SIDES.
COBBLE BOTTOM.

South Hominy Creek Design Data (Type: C)

Dimension	Min	Max	Pattern	Min	Max
Bankfull Width (ft)	28.1	37.2	Channel Belt Width (ft)	53.1	256.2
Floodprone Width (ft)	68.4	296	Radius of Curvature (ft)	10.7	256.2
Bankfull Cross-Sectional Area (ft2)	43.8	75.5	Rc:Bankfull Width (ft/ft)	0.4	6.9
Bankfull Mean Depth (ft)	1.5	2.2	Meander Wavelength (ft)	108	469.8
Bankfull Max Depth (ft)	2	3.3	Meander Width Ratio	1.9	6.9
Width/Depth Ratio	12	18.6	**Profile**	**Min**	**Max**
Entrenchment Ratio	2.4	8	Riffle Length (ft)	15.8	86.9
Bank Height Ratio	1	1.5	Riffle Slope (ft/ft)	0.00737	0.02669
Bankfull Wetted Perimeter (ft)	30.5	38.15	Pool Length (ft)	14.7	96.7
Hydraulic Radius (ft)	1.4	2.1	Pool Max Depth (ft)	3.6	8.8
D50 (mm)	15.2	62.3	Pool to Pool Spacing (ft)	44.2	309.4



PROFILE: SOUTH HOMINY CREEK - REACH 9
Scale: H: 1" = 50'
V: 1" = 10'

North Carolina Wildlife Resources Commission
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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

South Hominy Creek (Davis Site)
Reach 9 & 10 - Enhancement Plan & Profile

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

Project No. 92632
Date: 13-DEC-10
File Name: ush base.dwg
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Designed: JCF,CSL
Drawn: JCF
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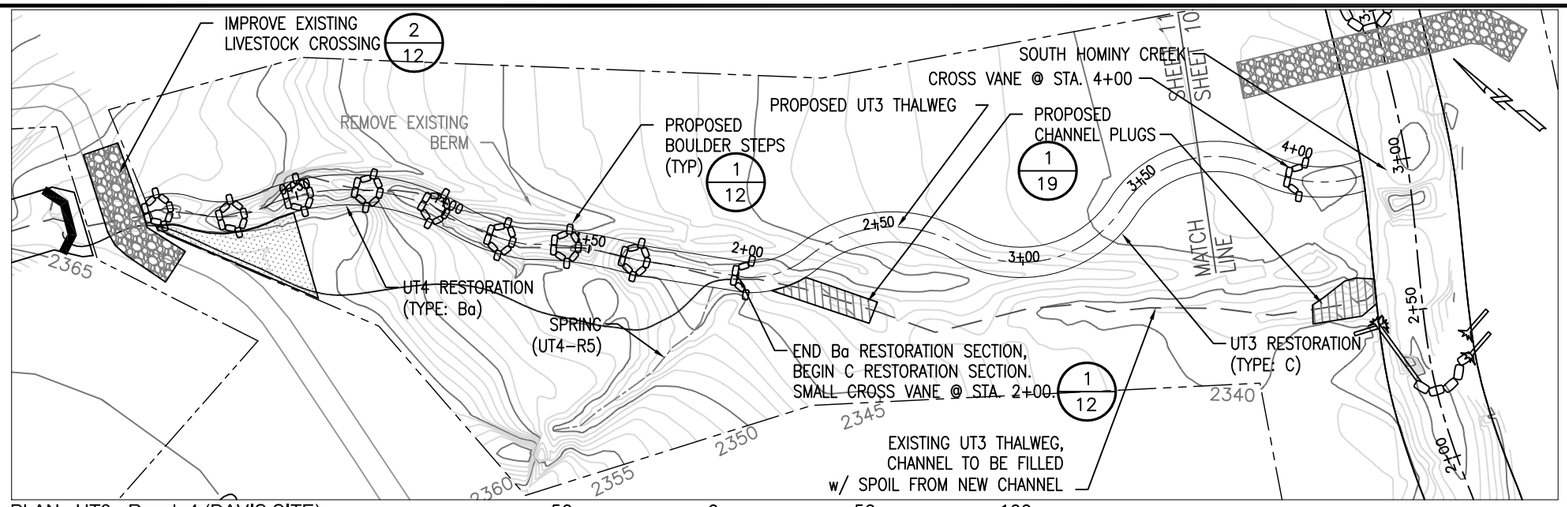
Sheet No. 10 of 25



PLAN: UT3 - Reach 4 (DAVIS SITE)
Scale: 1" = 50'

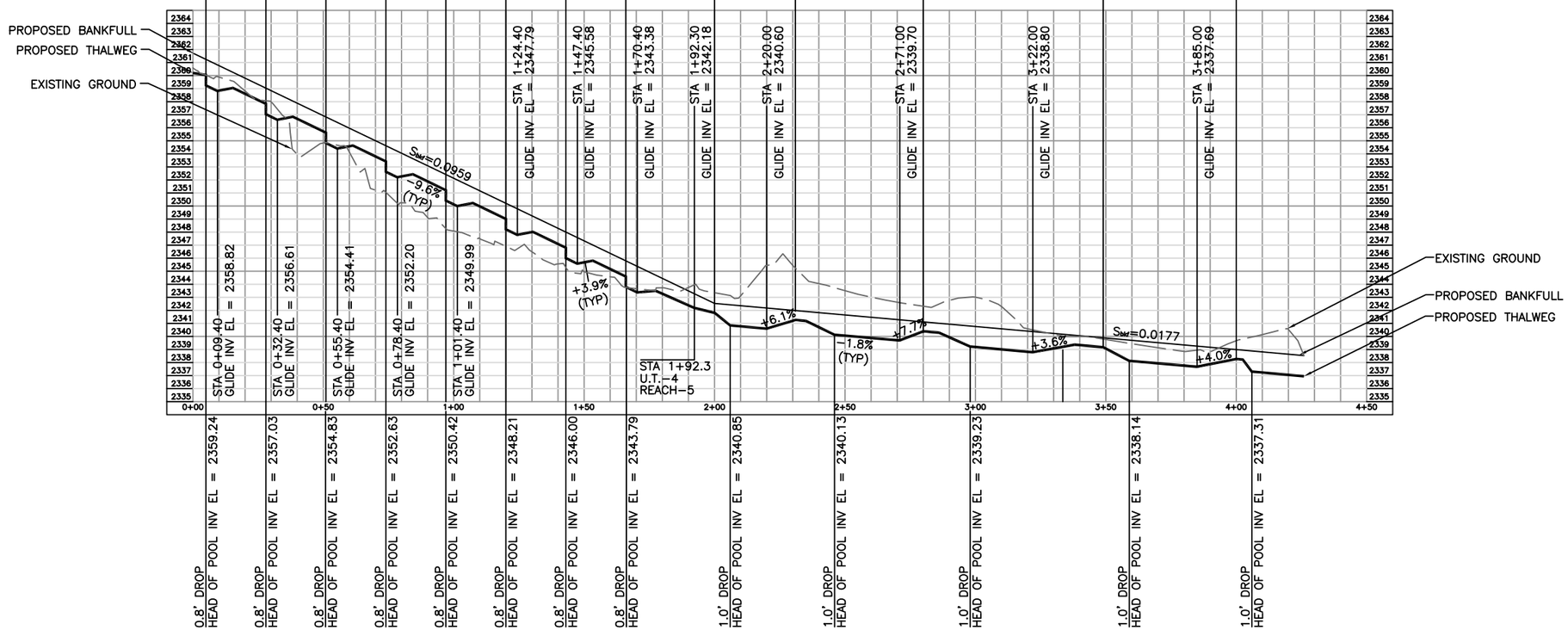
50 0 50 100
Scale: 1" = 50'

UT3 to South Hominy Creek (Type: Ba)					
Dimension and Subtrate	**Min**	**Ma**	**Pattern**	**Min**	**Ma**
Bankfull Width (ft)	8	12	Channel Belt Width (ft)	13.8	22.3
Floodprone Width (ft)	15	25	Radius of Curvature (ft)	33	71.9
Bankfull Cross-Sectional Area (ft2)	6	7.5	Rc:Bankfull Width (ft/ft)	4.1	6
Bankfull Mean Depth (ft)	0.4	0.6	Meander Wavelength (ft)	70	89.7
Bankfull Max Depth (ft)	1	1.4	Meander Width Ratio	1.7	1.2
Width/Depth Ratio	16	20	**Pro ile**	**Min**	**Ma**
Entrenchment Ratio	1.9	2.5	Riffle Length (ft)	1.8	2.2
Bank Height Ratio	1	1	Riffle Slope (ft/ft)	0.095	0.12
Bankfull Wetted Perimeter (ft)	10.4	10.9	Pool Length (ft)	4	4.8
Hydraulic Radius (ft)	0.77	1.11	Pool Max Depth (ft)	1.8	2.2
D50 (mm)	20	30	Pool to Pool Spacing (ft)	18	28

UT3 to South Hominy Creek (Type: C)					
Dimension and Subtrate	**Min**	**Ma**	**Pattern**	**Min**	**Ma**
Bankfull Width (ft)	10	12	Channel Belt Width (ft)	23.6	29.7
Floodprone Width (ft)	27	54	Radius of Curvature (ft)	30.1	43.6
Bankfull Cross-Sectional Area (ft2)	8.6	9.9	Rc:Bankfull Width (ft/ft)	3	4.4
Bankfull Mean Depth (ft)	0.5	0.7	Meander Wavelength (ft)	97.6	106.8
Bankfull Max Depth (ft)	0.9	2.2	Meander Width Ratio	2.5	2.9
Width/Depth Ratio	16	17.1	**Pro ile**	**Min**	**Ma**
Entrenchment Ratio	3.5	4.5	Riffle Length (ft)	10	18
Bank Height Ratio	1	1	Riffle Slope (ft/ft)	0.019	0.056
Bankfull Wetted Perimeter (ft)	10.6	11.6	Pool Length (ft)	13.4	32.3
Hydraulic Radius (ft)	0.9	1	Pool Max Depth (ft)	1	2.2
D50 (mm)	10	20	Pool to Pool Spacing (ft)	22.3	33.1

REFER TO TYPICAL DESIGN CROSS SECTIONS ON SHEET 12 OF 25

NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES.
STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.



PROFILE: UT3 - REACH 4 (DAVIS SITE)
Scale: H: 1" = 50'
V: 1" = 10'

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
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Waynesville, North Carolina 28786
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SOUTH HOMINY CREEK MITIGATION PLAN
BUNCOMBE COUNTY, NC
UT3 to South Hominy Creek
(Davis Site)
Reach 4 Restoration Plan & Profile

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
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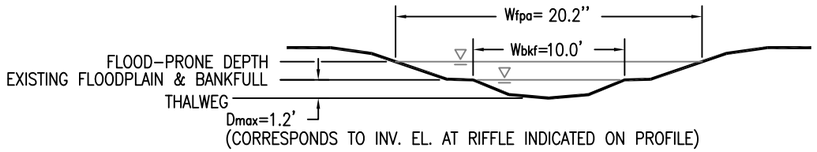
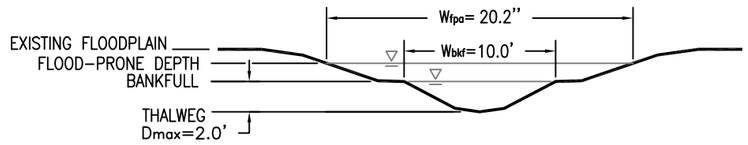
Fax: 919.715.2219

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

Project No. 92632
Date: 13-DEC-10
File Name: ush base.dwg
Surveyed: JCF,CSL,ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD
Sheet No. 11 of 25



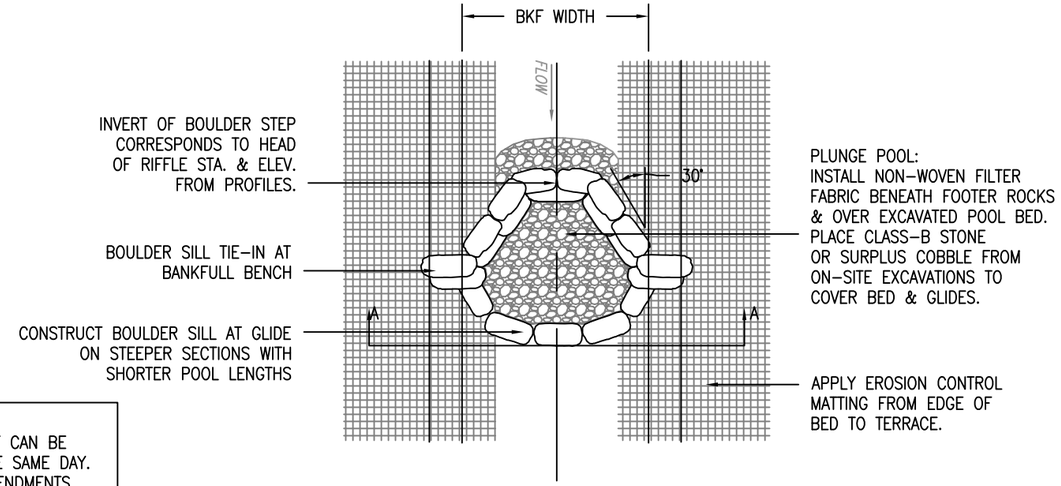
UT3-REACH 4 (STA 0+00 - 2+00):
TYPICAL RIFFLE CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'



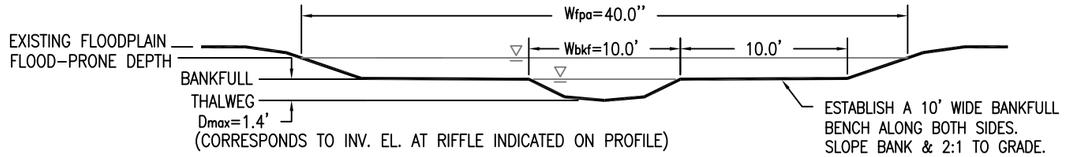
UT3-REACH 4 (STA 0+00 - 2+00):
TYPICAL POOL CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'

NOTE:
NCWRC STAFF WILL PROVIDE BENCHMARKS AND STATION LOCATIONS IN ORDER TO DETERMINE BANKFULL ELEVATIONS AT FEATURES. STRUCTURES MAY BE ADJUSTED AT ENGINEER'S DISCRETION BASED UPON FIELD OBSERVATIONS.

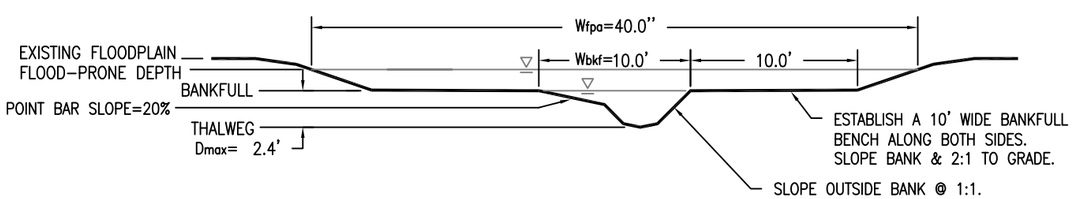
UT3 MATTING NOTES:
1. LIMIT DISTURBANCE TO AREAS THAT CAN BE RESHAPED AND MATTED WITHIN THE SAME DAY.
2. APPLY SEED, STRAW AND SOIL AMENDMENTS PRIOR TO INSTALLATION OF EROSION CONTROL MATTING.
3. EROSION CONTROL MATTING FOR BANKS ALONG RESTORED SECTIONS OF UT3 SHALL BE "EXCELSIOR" TYPE USING 100% BIODEGRADABLE PRODUCTS. MATTING SHALL BE NET FREE OR JUTE FIBER NETTING TYPE. NO MONOFILAMENT NETTING. MATTING SHALL HAVE A MIN. 1LB./S.F. SHEAR STRESS IN CHANNELS.
4. APPLY MATTING AS DESCRIBED ON SHEET 19.
5. JUTE MATTING OVER STRAW MAY BE INSTALLED ON TOP OF BANKFULL BENCHES AND OTHER LOW STRESS AREAS.



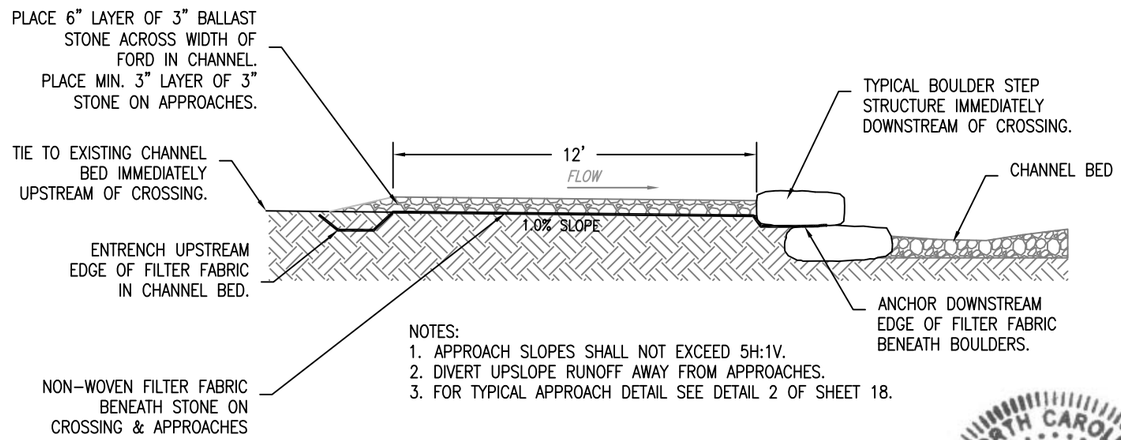
1/12 TYPICAL BOULDER STEP DETAIL
NO SCALE



UT3-REACH 4 (STA 2+00 - 4+26):
TYPICAL RIFFLE CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'



UT3-REACH 4 (STA 2+00 - 4+26):
TYPICAL POOL CROSS SECTION
Scale: H: 1" = 10'
V: 1" = 10'



NOTES:
1. APPROACH SLOPES SHALL NOT EXCEED 5H:1V.
2. DIVERT UPSLOPE RUNOFF AWAY FROM APPROACHES.
3. FOR TYPICAL APPROACH DETAIL SEE DETAIL 2 OF SHEET 18.

2/12 IMPROVED LIVESTOCK CROSSING AT UT3
NO SCALE

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

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SOUTH HOMINY CREEK MITIGATION PLAN
BUNCOMBE COUNTY, NC
UT3 to South Hominy Creek
(Davis Site)
Restoration Details

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
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Project No. 92632
Date: 13-DEC-10
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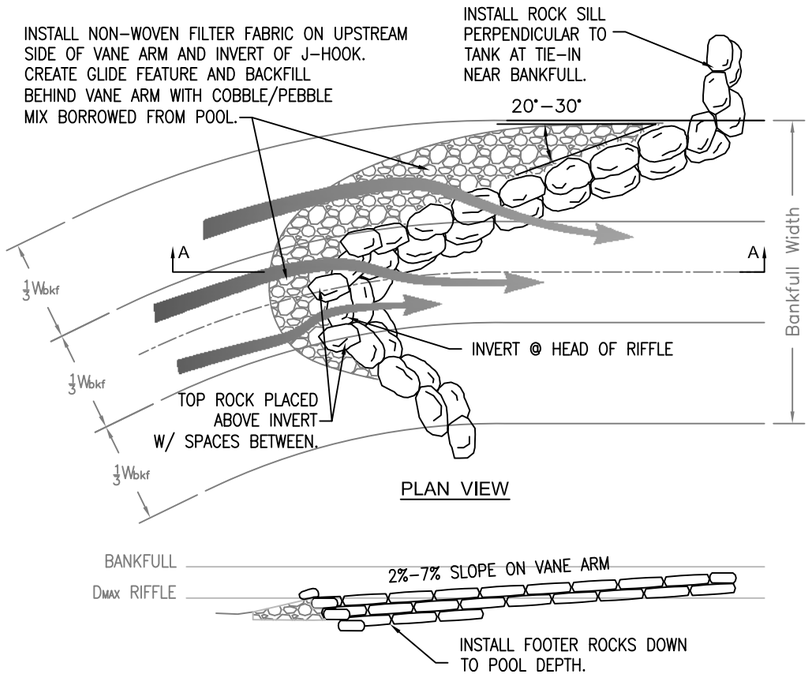
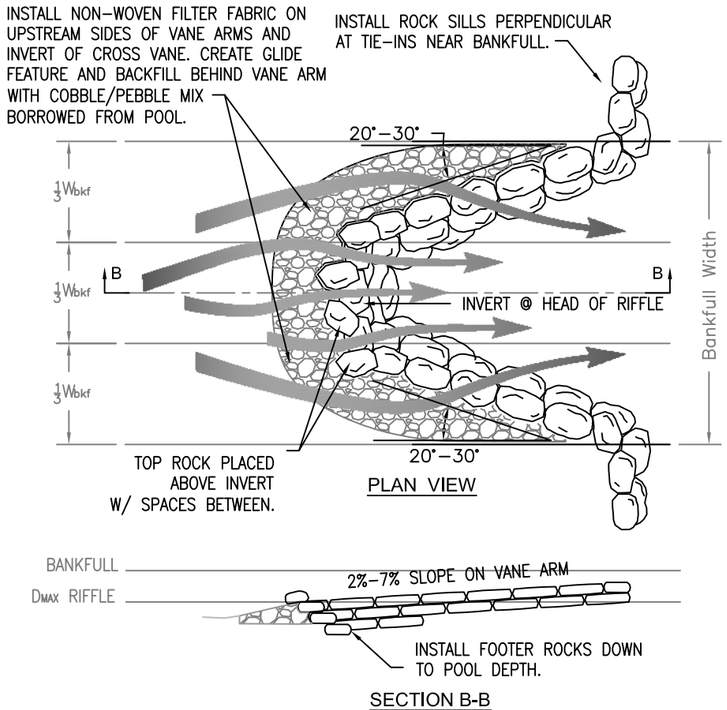


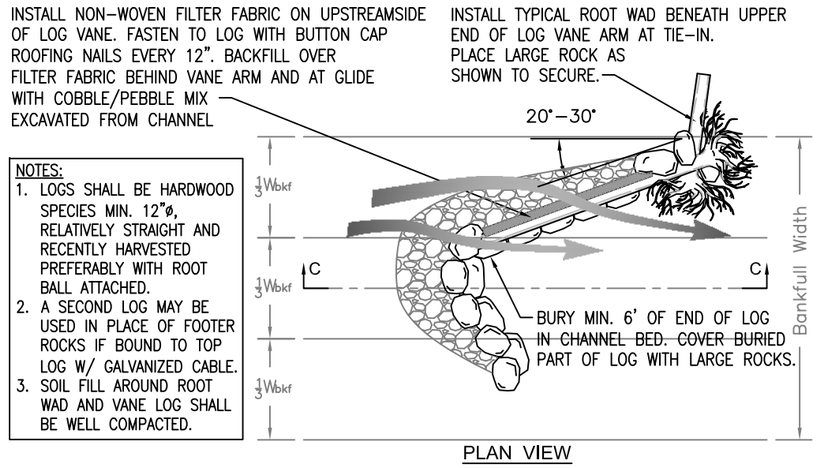
1/13 SOUTH HOMINY CREEK - TYPICAL J-HOOK DETAIL
NO SCALE

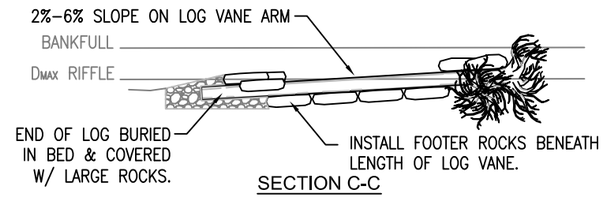


2/13 SOUTH HOMINY CREEK - TYPICAL CROSS VANE DETAIL
NO SCALE

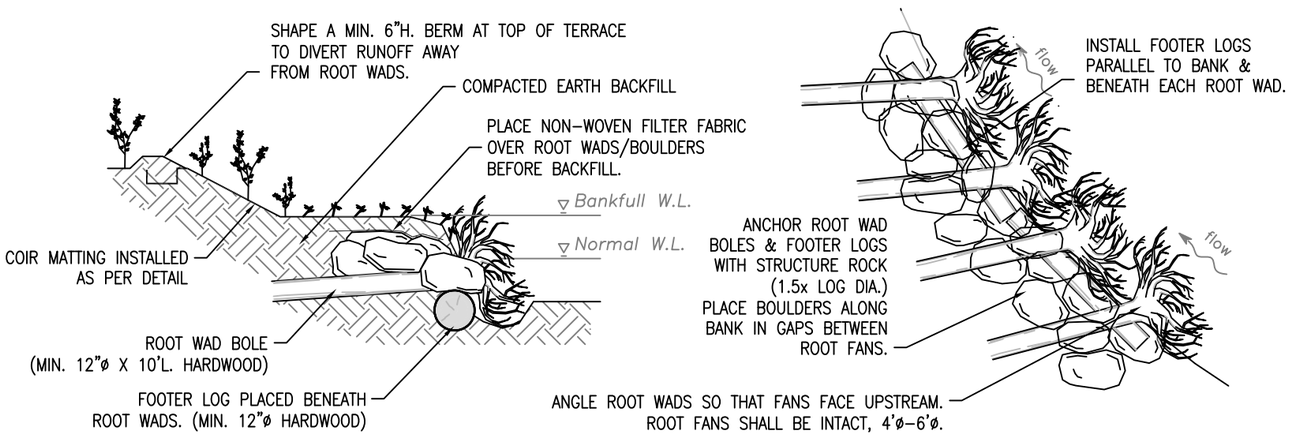
SOUTH HOMINY CREEK STRUCTURE DATA:

1. BOULDER SIZE: 3.1' MIN. WIDTH AT INTERMEDIATE AXIS. IDEAL BOULDER DIMENSIONS FOR VANES WOULD BE APPROXIMATELY 5'L. x 3.1'W x 2'T.
2. VANE LENGTHS VARY BY TYPE OF STRUCTURE AND RADIUS OF CURVATURE AND DEPARTURE ANGLE AT LOCATION OF STRUCTURE. FOR J–HOOK & CROSS VANE STRUCTURES WHERE W_{bkf}=30', V_L SHOULD RANGE BETWEEN 25.8'–36.5'.





3/13 SOUTH HOMINY CREEK - TYPICAL LOG VANE DETAIL
NO SCALE



4/13 SOUTH HOMINY CREEK - TYPICAL ROOT WAD DETAIL
NO SCALE

North Carolina Wildlife Resources Commission
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Waynesville, North Carolina 28786
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SOUTH HOMINY CREEK MITIGATION PLAN
BUNCOMBE COUNTY, NC

SOUTH HOMINY CREEK
IN -STREAM STRUCTURE DETAILS

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
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NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

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Drawn: JCF
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Sheet No. 13 of 25

LIMIT OF DISTURBANCE AREA FOR ENTIRE PROJECT = 13.92 AC.

LEGEND

- Conservation Easement Boundary
- Existing Thalweg
- Existing Thalweg (Springs)
- Existing Gravel Drive
- Proposed Center Line of Channel
- Fencing
- E&S Travel Corridor
- SF — E&S Silt Fence
- LOD — E&S Limit of Disturbance
- Temporary Construction Entrance
- T — Temporary Stream Crossing
- Culvert
- Rock Lined Outlet
- Proposed Rock Cross Vane
- Proposed Rock J-Hook
- Proposed Log Vane
- Proposed Root Wad
- Proposed Log Step

RESIDENCE
SHED
SHED
2395
2390
2385
2380
2375
2370
2365
2360
2355
EXISTING FENCE
FILTER FABRIC & 3"ø GRAVEL ON APPROACHES
TEMPORARY CHANNEL CROSSING SEE DETAIL: 2/18
BRIDGE: NO TRUCKS OR EQUIPMENT
MATCH LINE
SHEET 15
SHEET 14
STAGING AREA #5
BURN AREA
STAGING AREA #6
STOCKPILE AREA
PROPOSED 24"ø RCP CULVERT. (SHEET 9)
CANTER FIELD LN
LIMIT OF DISTURBANCE
CHANNEL PLUGS
SILT FENCE
STOCKPILE AREA
PROPOSED UT1 RESTORATION
STAGING AREA #3
STAGING AREA #4
STOCKPILE AREA
BURN AREA
TEMPORARY COSTRUCTION ENTRANCE SEE DETAIL: 3/18
FILL EXISTING TRENCH
WETLAND "L" ENHANCEMENT AREA
STAGING AREA #2
BARN
SILT FENCE SEE DETAIL: 1/18
LIMIT OF DISTURBANCE
TRAVEL CORRIDOR (TYP)
UT2 ENHANCEMENT SECTION
STAGING AREA #1
PROPOSED SOUTH HOMINY CREEK RESTORATION & ENHANCEMENT

80 0 80 160
Scale: 1" = 80'

NOTES:
1. SEE SHEETS 18–20 FOR EROSION & SEDIMENTATION CONTROL PRACTICE DETAILS
2. SEE SHEETS 21 & 22 FOR PLANTING PLAN.
3. CONSTRUCTION ENTRANCES SHALL BE ESTABLISHED BEFORE DELIVERY OF ANY MATERIALS OR EQUIPMENT.
4. INSTALL & MAINTAIN SEDIMENT (SILT) FENCE AROUND ALL AREAS DESIGNATED FOR STOCKPILING BOULDERS, LOGS, STONE & SOIL UNTIL AFTER THESE AREAS HAVE BEEN CLEANED UP AND STABILIZED.
5. DISTURBED CHANNEL BANKS SHALL BE SEEDED, MULCHED & MATTED TO PROVIDE MIN. 75% COVERAGE BEFORE THE END OF THE SAME DAY. ALL OTHER DISTURBED AREAS SHALL BE SEEDED AND MULCHED SO AS TO PROVIDE MIN. 75% COVERAGE WITHIN 21 DAYS.
6. MATERIALS PLACED IN DESIGNATED STAGING AREAS SHALL BE INSTALLED ON THE SAME DAY.
7. PROPOSED FENCING SHOWN SHALL BE INSTALLED AFTER RESTORATION/ENHANCEMENT AND CLEAN UP HAS BEEN COMPLETED EXCEPT WHERE TEMPORARY FENCING OR GATES ARE REQUIRED FOR LIVESTOCK MANAGEMENT.
8. BURNING OF WOODY DEBRIS SHALL ONLY BE DONE ON DAYS WITH LITTLE OR NO WIND WHEN NO BURNING BAND IS IN EFFECT. ALL OTHER DEBRIS WILL BE HAULED FROM SITE TO THE COUNTY SANITARY LANDFILL.

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EROSION & SEDIMENT CONTROL PLAN
BIANCULLI SECTION

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
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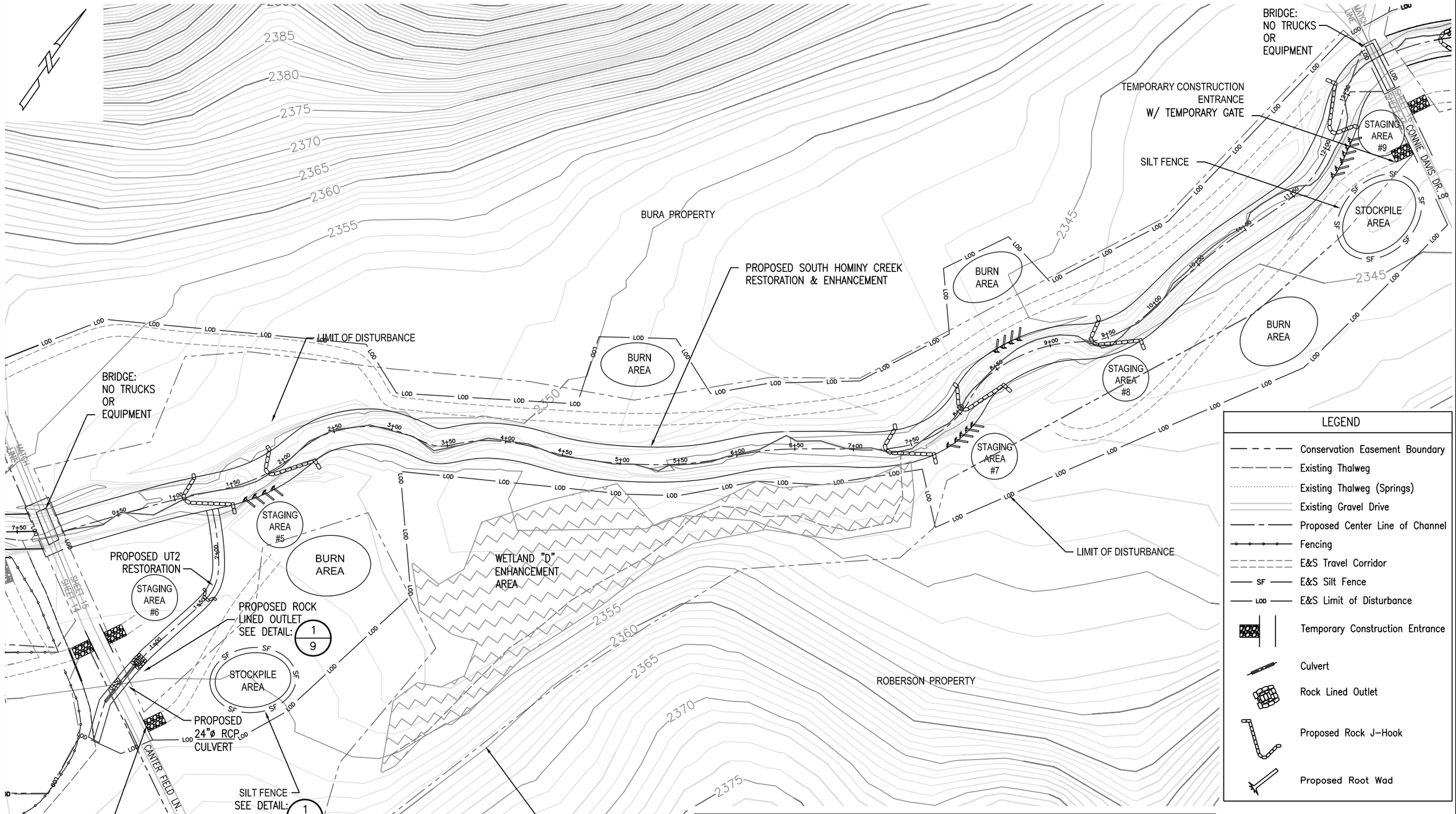

80 0 80 160

Scale: 1" = 80'

LIMIT OF DISTURBANCE AREA FOR ENTIRE PROJECT = 13.92 AC.

LEGEND

- Conservation Easement Boundary
- Existing Thalweg
- Existing Thalweg (Springs)
- Existing Gravel Drive
- Proposed Center Line of Channel
- Fencing
- E&S Travel Corridor
- SF — E&S Silt Fence
- LOD — E&S Limit of Disturbance
- Temporary Construction Entrance
- Culvert
- Rock Lined Outlet
- Proposed Rock J-Hook
- Proposed Root Wad

NOTES:

1. SEE SHEETS 18–20 FOR EROSION & SEDIMENTATION CONTROL PRACTICE DETAILS
2. SEE SHEETS 21 & 23 FOR PLANTING PLAN.
3. CONSTRUCTION ENTRANCES SHALL BE ESTABLISHED BEFORE DELIVERY OF ANY MATERIALS OR EQUIPMENT.
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6. MATERIALS PLACED IN DESIGNATED STAGING AREAS SHALL BE INSTALLED ON THE SAME DAY.
7. PROPOSED FENCING SHOWN SHALL BE INSTALLED AFTER RESTORATION/ENHANCEMENT AND CLEAN UP HAS BEEN COMPLETED EXCEPT WHERE TEMPORARY FENCING OR GATES ARE REQUIRED FOR LIVESTOCK MANAGEMENT.
8. BURNING OF WOODY DEBRIS SHALL ONLY BE DONE ON DAYS WITH LITTLE OR NO WIND WHEN NO BURNING BAND IS IN EFFECT. ALL OTHER DEBRIS WILL BE HAULED FROM SITE TO THE COUNTY SANITARY LANDFILL.

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EROSION & SEDIMENT CONTROL PLAN
BURA/ROBERSON SITE

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
Fax: 919.715.2219

Project No. 92632

Date: 13-DEC-10

File Name: ush base.dwg

Surveyed: JCF,CSL,ABB
Designed: JCF,CSL
Drawn: JCF
Approved: SLD

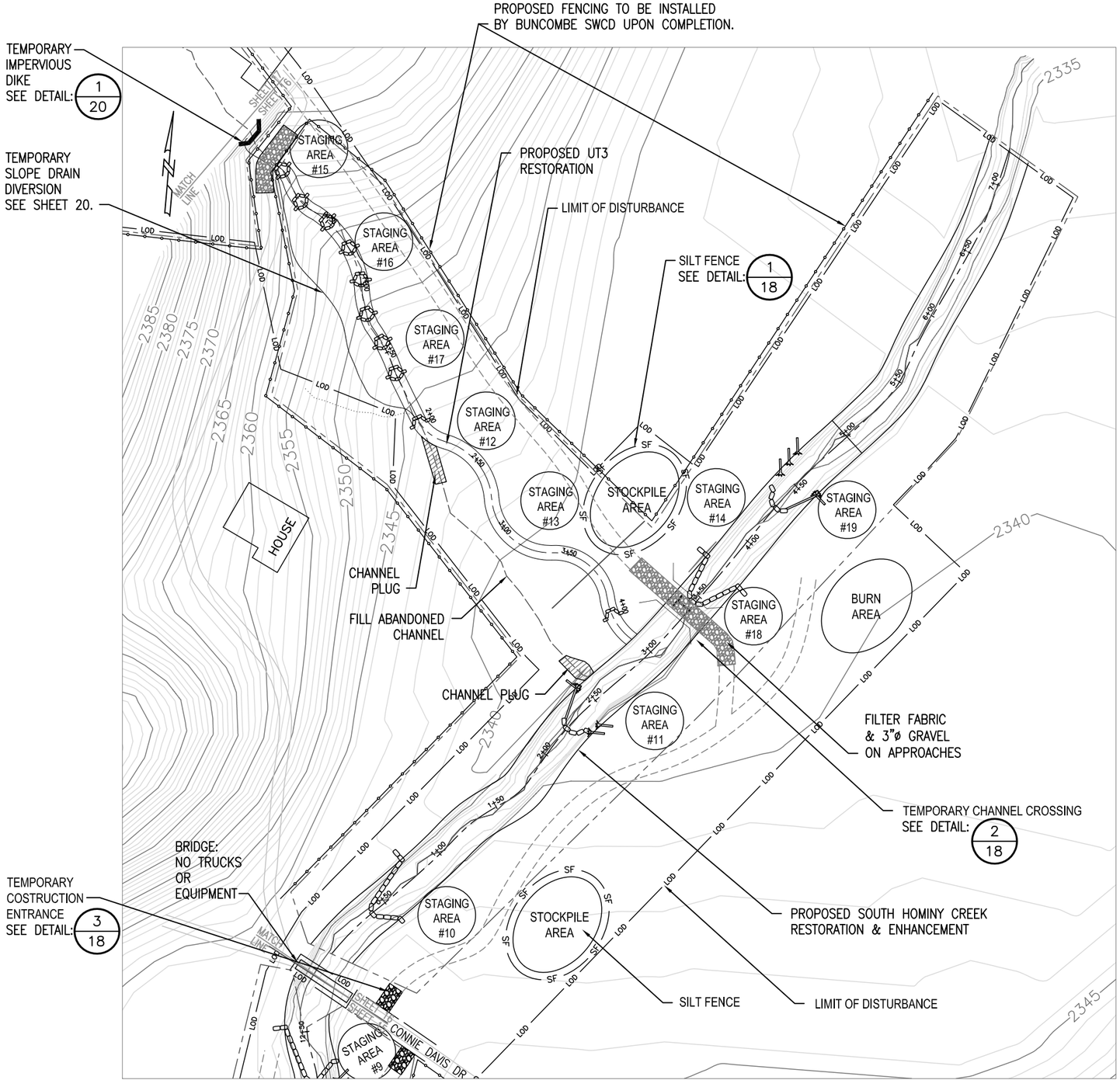
Sheet No. 15 of 25

LEGEND

- Conservation Easement Boundary
- Existing Thalweg
- Existing Gravel Drive
- Proposed Center Line of Channel
- Fencing
- E&S Travel Corridor
- SF — E&S Silt Fence
- LOD — E&S Limit of Disturbance
- Temporary Construction Entrance
- T — Temporary Channel Crossing
- Temporary Impervious Dike
- Proposed Rock Cross Vane
- Proposed Rock J–Hook
- Proposed Log Vane
- Proposed Root Wad
- Proposed Boulder Step

LIMIT OF DISTURBANCE AREA FOR ENTIRE PROJECT = 13.92 AC.

NOTES:
1. SEE SHEETS 18–20 FOR EROSION & SEDIMENTATION CONTROL PRACTICE DETAILS
2. SEE SHEETS 21 & 24 FOR PLANTING PLAN.
3. CONSTRUCTION ENTRANCES SHALL BE ESTABLISHED BEFORE DELIVERY OF ANY MATERIALS OR EQUIPMENT.
4. INSTALL & MAINTAIN SEDIMENT (SILT) FENCE AROUND ALL AREAS DESIGNATED FOR STOCKPILING BOULDERS, LOGS, STONE & SOIL UNTIL AFTER THESE AREAS HAVE BEEN CLEANED UP AND STABILIZED.
5. DISTURBED CHANNEL BANKS SHALL BE SEEDED, MULCHED & MATTED TO PROVIDE MIN. 75% COVERAGE BEFORE THE END OF THE SAME DAY. ALL OTHER DISTURBED AREAS SHALL BE SEEDED AND MULCHED SO AS TO PROVIDE MIN. 75% COVERAGE WITHIN 21 DAYS.
6. MATERIALS PLACED IN DESIGNATED STAGING AREAS SHALL BE INSTALLED ON THE SAME DAY.
7. PROPOSED FENCING SHOWN SHALL BE INSTALLED AFTER RESTORATION/ENHANCEMENT AND CLEAN UP HAS BEEN COMPLETED EXCEPT WHERE TEMPORARY FENCING OR GATES ARE REQUIRED FOR LIVESTOCK MANAGEMENT.
8. BURNING OF WOODY DEBRIS SHALL ONLY BE DONE ON DAYS WITH LITTLE OR NO WIND WHEN NO BURNING BAND IS IN EFFECT. ALL OTHER DEBRIS WILL BE HAULED FROM SITE TO THE COUNTY SANITARY LANDFILL.



80 0 80 160
Scale: 1" = 80'

North Carolina Wildlife Resources Commission
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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EROSION & SEDIMENT CONTROL PLAN
DAVIS SECTION (LOWER)

Prepared for:
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NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

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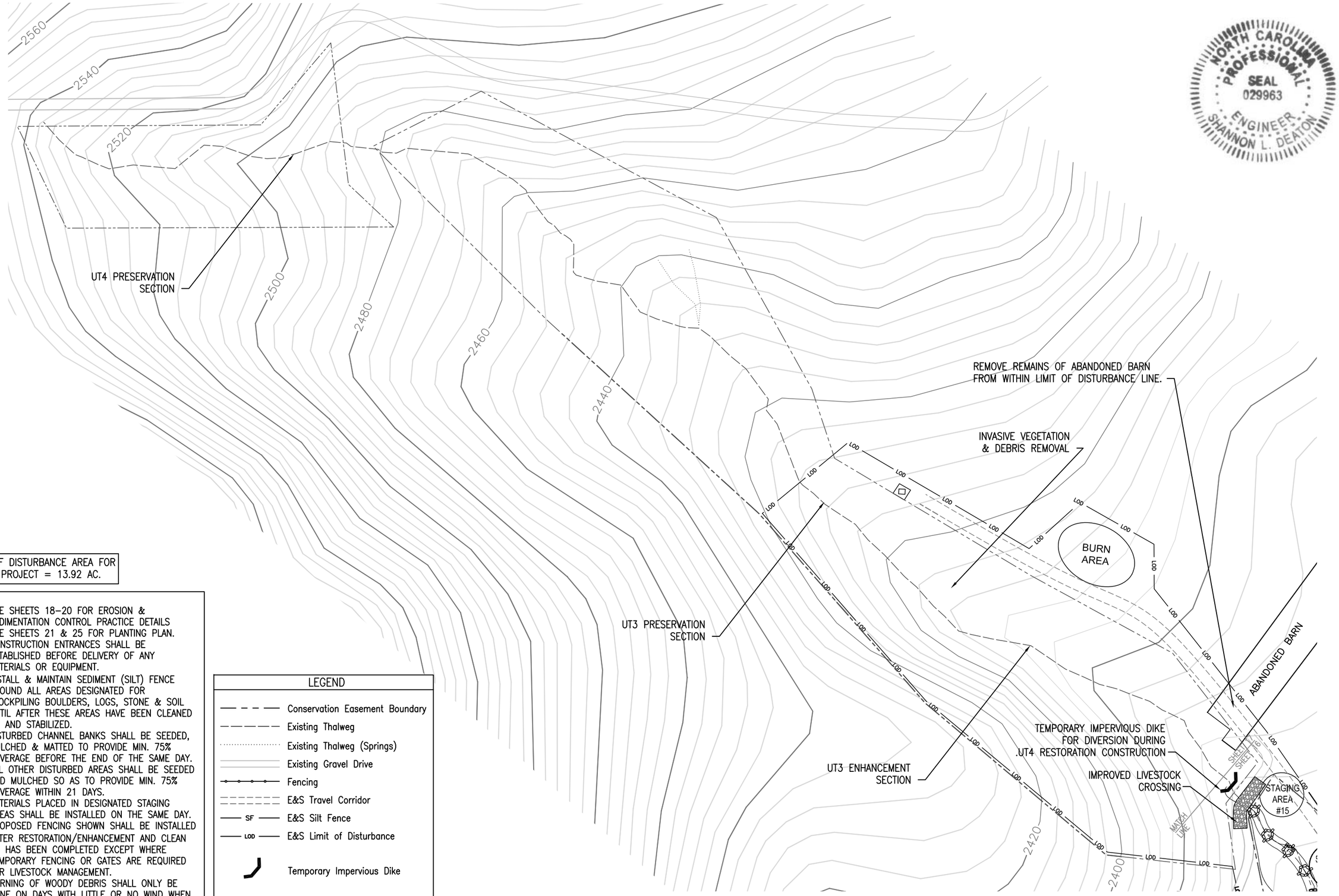
Designed:	JCF,CSL
Drawn:	JCF
Approved:	SLD
Sheet No.	16 of 25



LIMIT OF DISTURBANCE AREA FOR ENTIRE PROJECT = 13.92 AC.

NOTES:

1. SEE SHEETS 18-20 FOR EROSION & SEDIMENTATION CONTROL PRACTICE DETAILS
2. SEE SHEETS 21 & 25 FOR PLANTING PLAN.
3. CONSTRUCTION ENTRANCES SHALL BE ESTABLISHED BEFORE DELIVERY OF ANY MATERIALS OR EQUIPMENT.
4. INSTALL & MAINTAIN SEDIMENT (SILT) FENCE AROUND ALL AREAS DESIGNATED FOR STOCKPILING BOULDERS, LOGS, STONE & SOIL UNTIL AFTER THESE AREAS HAVE BEEN CLEANED UP AND STABILIZED.
5. DISTURBED CHANNEL BANKS SHALL BE SEEDED, MULCHED & MATTED TO PROVIDE MIN. 75% COVERAGE BEFORE THE END OF THE SAME DAY. ALL OTHER DISTURBED AREAS SHALL BE SEEDED AND MULCHED SO AS TO PROVIDE MIN. 75% COVERAGE WITHIN 21 DAYS.
6. MATERIALS PLACED IN DESIGNATED STAGING AREAS SHALL BE INSTALLED ON THE SAME DAY.
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8. BURNING OF WOODY DEBRIS SHALL ONLY BE DONE ON DAYS WITH LITTLE OR NO WIND WHEN NO BURNING BAND IS IN EFFECT. ALL OTHER DEBRIS WILL BE HAULED FROM SITE TO THE COUNTY SANITARY LANDFILL.

LEGEND

- Conservation Easement Boundary
- Existing Thalweg
- Existing Thalweg (Springs)
- Existing Gravel Drive
- Fencing
- E&S Travel Corridor
- SF — E&S Silt Fence
- LOD — E&S Limit of Disturbance
- Temporary Impervious Dike
- Proposed Boulder Step

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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EROSION & SEDIMENT CONTROL PLAN
DAVIS SECTION (UPPER)

Prepared for:
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Project No. 92632
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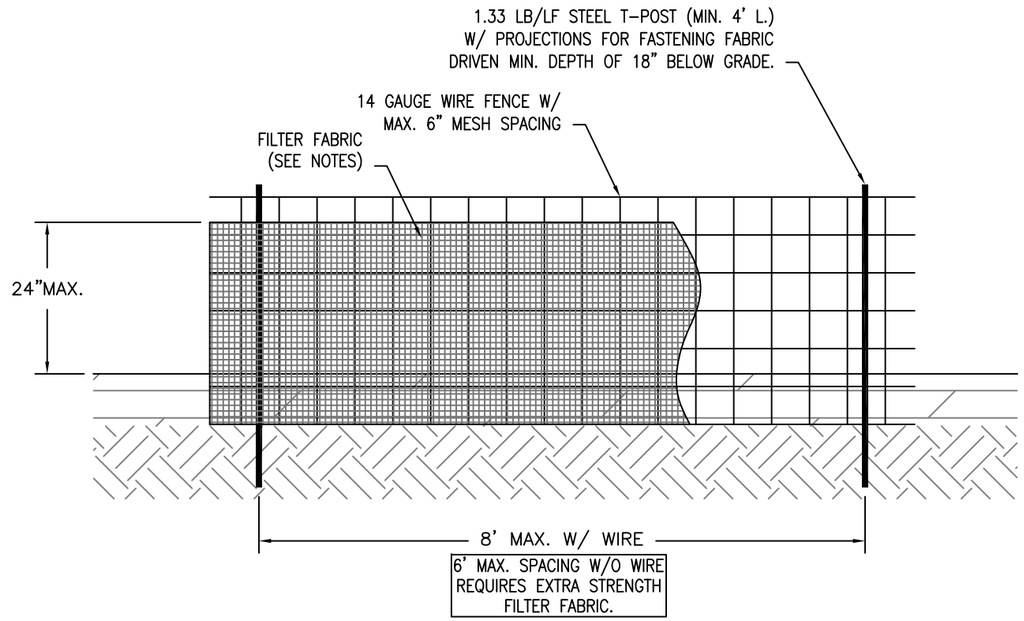
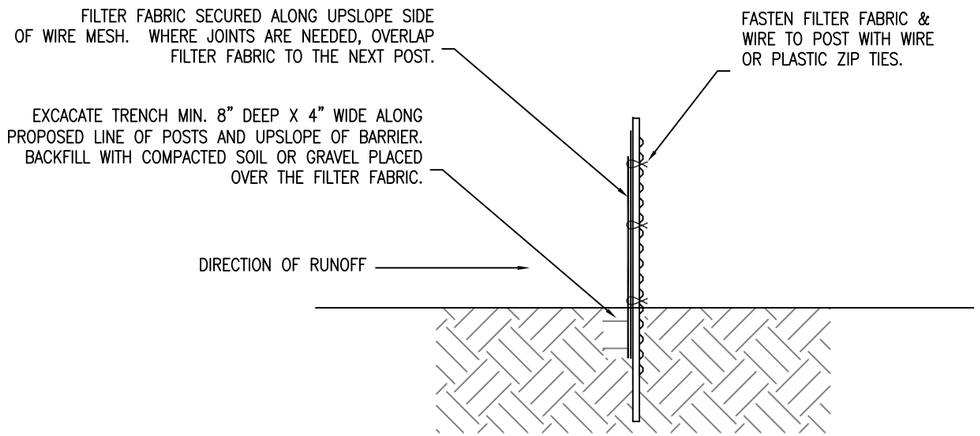
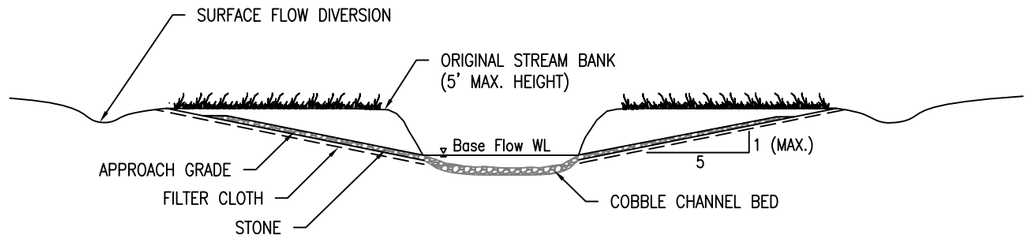




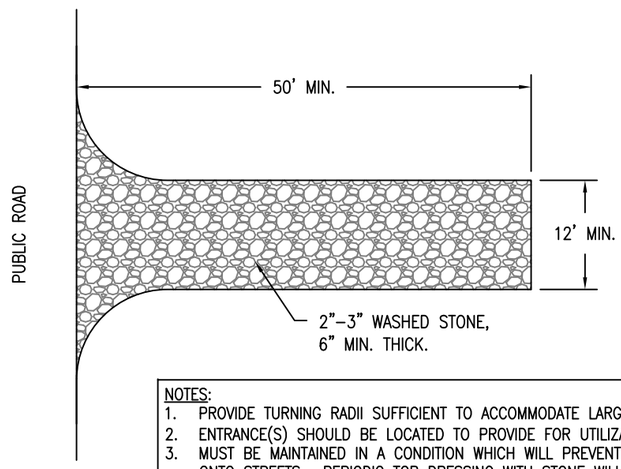
NOTES:
1. FILTER FABRIC MUST MEET THE FOLLOWING REQUIREMENTS:
   FILTERING EFFICIENCY (MIN.): 85%
   TENSILE STRENGTH @ 20% (MAX.) ELONGATION: 30LB/L. IN. (STANDARD), 50LB/L. IN. (EXTRA STRENGTH)
   SLURRY FLOW RATE (MIN.): 0.3GAL./SQ. FT./MIN.
2. DO NOT ATTACH FILTER FABRIC TO EXISTING TREES.
3. INSPECT SEDIMENT FENCES AT LEAST ONCE PER WEEK AND AFTER EACH RAINFALL. REPAIR ANY COLLAPSE OR UNDERMINING. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR NEXT RAINFALL.
4. MAINTAIN SEDIMENT FENCES UNTIL CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

1/18 SEDIMENT (SILT) FENCE DETAIL
NO SCALE



NOTES:
1. FORD CROSSINGS SHOULD BE LOCATED WHERE NORMAL FLOW IS SHALLOW (<3" DEEP).
2. APPROACH SECTIONS ARE SUBJECT TO EROSION. FORDS SHOULD NOT BE USED WHERE BANK HEIGHTS ARE > 5'.
3. INSTALL DIVERSIONS AT TOPS OF BOTH APPROACH GRADES TO DIRECT SURFACE RUNOFF AWAY FROM FORD AND TOWARD UNDISTURBED AREAS ADJOINING THE STREAM.
4. FORDS SHOULD BE CONSTRUCTED AT RIGHT ANGLE TO STREAM FLOW.
5. KEEP CLEARING OF STREAM BANKS, BED AND APPROACHES TO A MINIMUM, BUT ENSURE THAT FORDS ARE OF SUFFICIENT WIDTH FOR CROSSING VEHICLES.
6. APPROACH GRADES SHOULD NOT EXCEED 5H:1V SLOPE.
7. ALIGN ROAD APPROACHES WITH CENTERLNE OF CROSSING FOR A MIN. OF 30'.
8. PLACE NON-WOVEN FILTER FABRIC ALONG APPROACH GRADES PRIOR TO PLACING STONE.
9. PLACE MIN. 4" LAYERS OF 3"ø BALLAST STONE ON APPROACH GRADES.
10. WHERE POSSIBLE, FORDS SHOULD BE CONSTRUCTED BY SHALLOW FILLING USING NATURAL BED MATERIAL.
11. INSPECT FORDS AFTER RUNOFF PRODUCING RAINS. REPAIR ANY DAMAGE AND REPLACE ANY DISPLACED STONE.
12. REMOVE TEMPORARY STREAM CROSSINGS WHEN NO LONGER NEEDED. RESTORE THE STREAM CHANNEL TO ITS ORIGINAL CROSS SECTION. SMOOTH AND APPROPRIATELY STABILIZE ANY DISTURBED AREAS.

2/18 TEMPORARY STREAM CROSSING DETAIL
NO SCALE



NOTES:
1. PROVIDE TURNING RADII SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
2. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
3. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOP DRESSING WITH STONE WILL BE NECESSARY.
4. ANY MATERIAL TRACKED ONTO PUBLIC ROADWAY MUST BE CLEANED UP IMMEDIATELY.
5. GRAVEL CONSTRUCTION ENTRANCE(S) SHALL BE LOCATED AT ALL POINTS OF INGRESS & EGRESS, AND SHALL BE MAINTAINED UNTIL THE SITE IS STABILIZED.
6. PLACE FILTER FABRIC BENEATH STONE IN AREAS SUBJECT TO SEEPAGE OR HIGH WATER TABLE.
7. IF CONDITIONS AT THE SITE ARE SUCH THAT MOST OF THE MUD & SEDIMENT ARE NOT REMOVED WHEN VEHICLES TRAVEL OVER THE GRAVEL, TIRES SHOULD BE WASHED BEFORE LEAVING THE SITE. WASHING SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO A SEDIMENT TRAP OR OTHER SUITABLE DISPOSAL AREA.

3/18 CONSTRUCTION ENTRANCE DETAIL
NO SCALE

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SOUTH HOMINY CREEK MITIGATION PLAN
BUNCOMBE COUNTY, NC

EROSION & SEDIMENT CONTROL DETAILS

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
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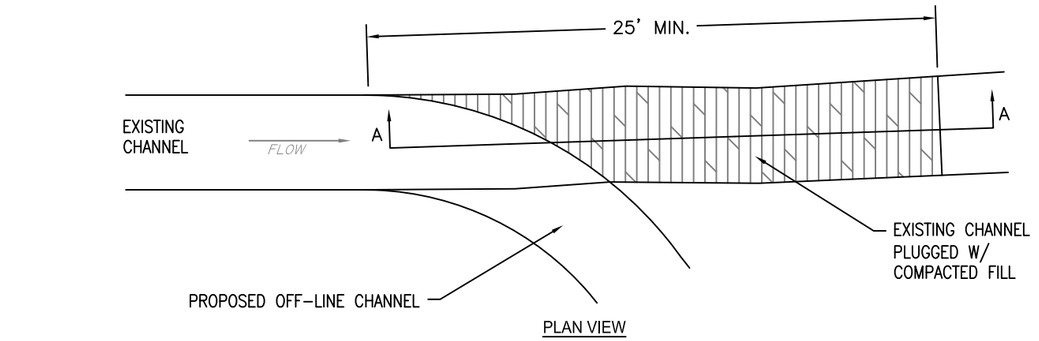
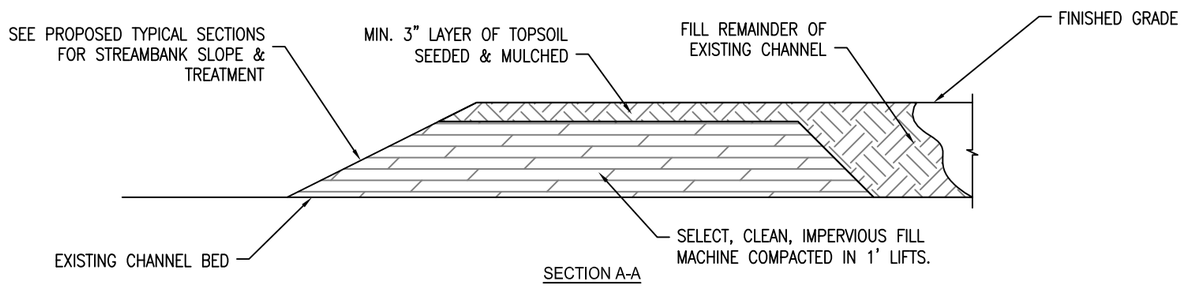
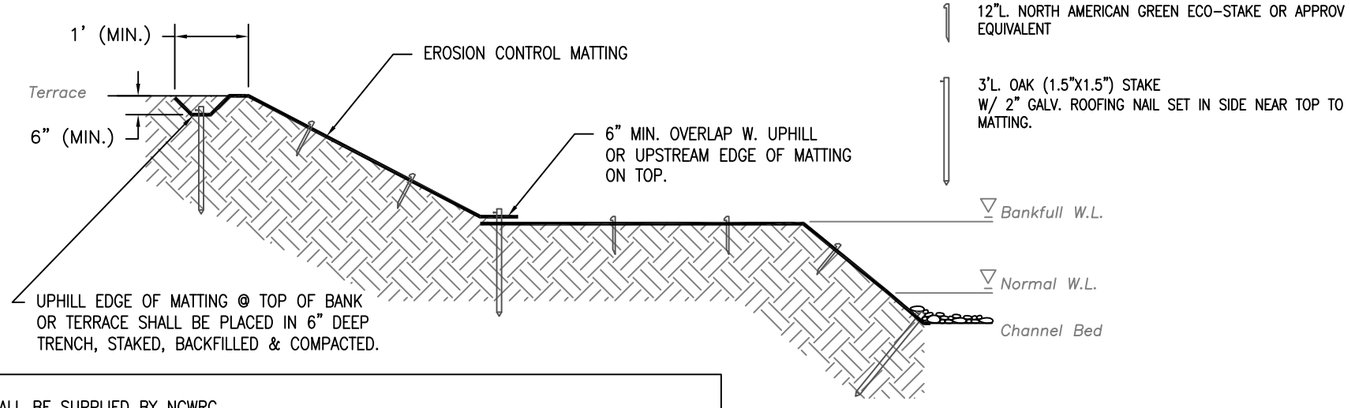




1/19 CHANNEL PLUG DETAIL
NO SCALE



NOTES:
1. ALL MATTING AND STAKES SHALL BE SUPPLIED BY NCWRC.
2. GRADED BANKS SHALL BE SEEDED AND MULCHED PRIOR TO INSTALLATION OF MATTING.
3. MATTING SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
4. METAL STAKES OR STAPLES SHALL NOT BE USED.
5. STAKES SHALL BE SET IN A DIAMOND PATTERN AT MAX. 3' APART. USE 3' OAK STAKES ALONG TOE NEAR CHANNEL BED, AT ALL OVERLAPS AND IN TOP TRENCH SET @ 3'O.C.
6. LENGTH OF MATTING SHOULD TYPICALLY RUN PARALLEL WITH DIRECTION OF STREAM FLOW. ALL OVERLAPS SHOULD BE MIN. 6" WITH EDGE OF UPHILL OR UPSTREAM SECTION ON TOP.

2/19 EROSION CONTROL MATTING DETAIL
NO SCALE

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SOUTH HOMINY CREEK MITIGATION PLAN
BUNCOMBE COUNTY, NC

EROSION & SEDIMENT CONTROL DETAILS

Prepared for:
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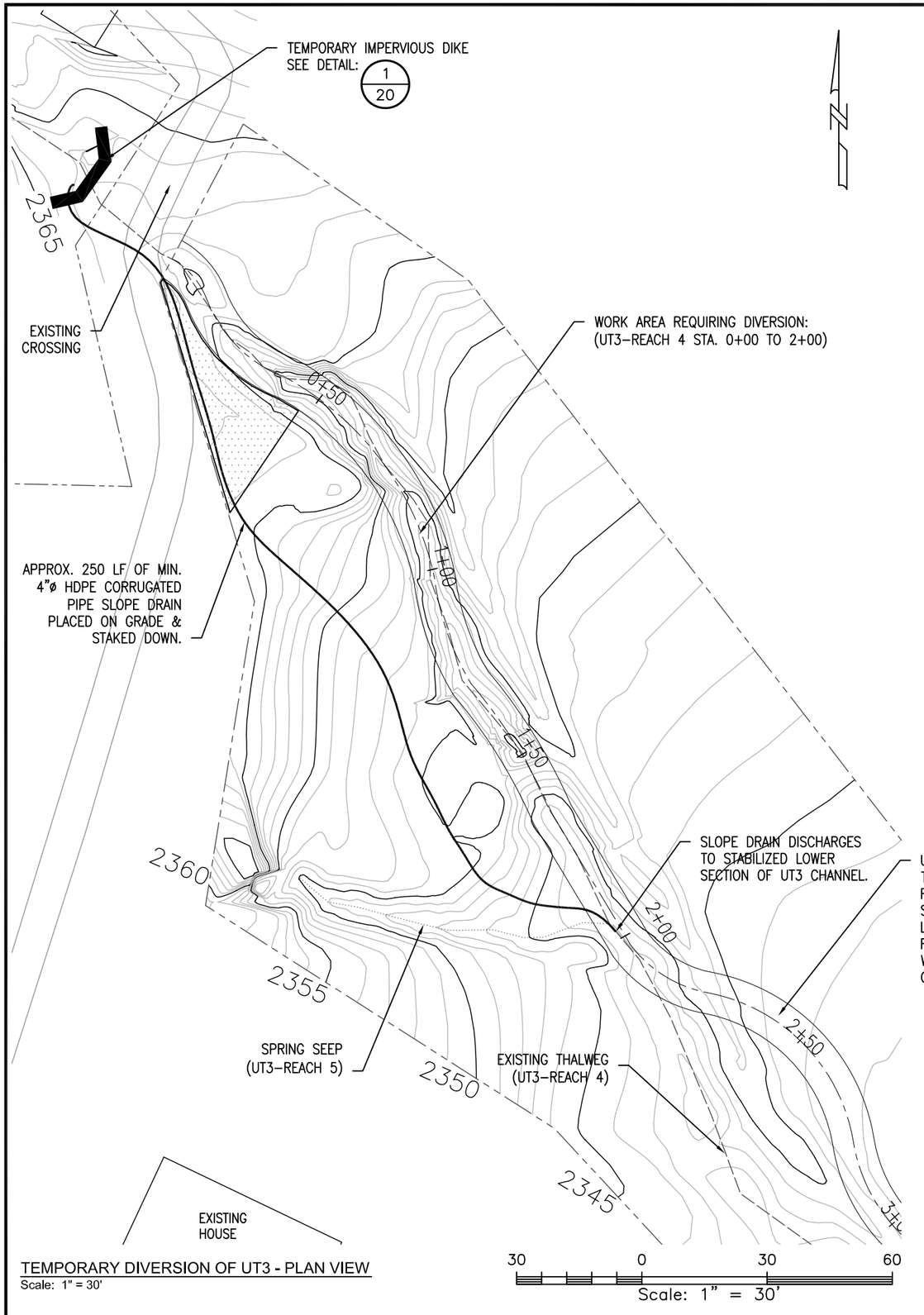
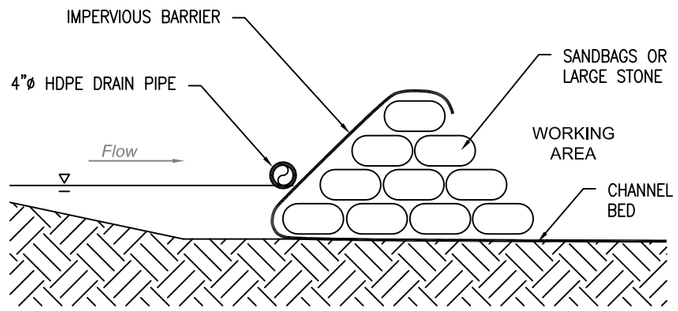


TEMPORARY DIVERSION OF UT3 - PLAN VIEW
Scale: 1" = 30'



1/20 TEMPORARY IMPERVIOUS DIKE DETAIL
NO SCALE

NOTES:
1. ON LOW OR INTERMITTENT FLOW TRIBS WITH SUFFICIENT FALL, INSTALL A TEMPORARY IMPERVIOUS DIKE WITH SLOPE DRAIN TO DIVERT FLOW AROUND WORKING AREA.
2. PREPARE BED AT LOCATION OF IMPERVIOUS DIKE BY REMOVING ANY DEBRIS AND SMOOTHING THE BANKS AND BED.
3. LAY HEAVY IMPERMEABLE SHEETING ACROSS WIDTH OF CHANNEL.
4. BUILD A GROIN OF SANDBAGS OR WELL PLACED, CLASS "B" OR LARGER STONE ATOP THE SHEETING TO A HEIGHT OF 2'–3' FROM BANK TO BANK.
5. CUT A NARROW TRENCH ALONG ONE BANK AROUND THE END OF THE DIKE TO PLACE THE DRAIN PIPE INVERT AT APPROX. 1' ABOVE THE CHANNEL BED. SEAL THE TRENCH AROUND THE PIPE WITH PACKED CLAY FILL.
6. PIPE SHALL BE A MIN. 4"ø HDPE FLEXIBLE CAPABLE OF CARRYING 2 CFS BASE FLOW.
7. LAY PIPE ON EXISTING GRADE OUTSIDE OF THE WORKING AREA TO DISCHARGE INTO EXISTING, STABILIZED CHANNEL BELOW WORKING AREA.
8. STAKE & TIE DOWN SLOPE DRAIN PIPE AT BENDS.
9. REGULARLY MONITOR IMPOUNDMENT AND DIVERSION PIPE FOR CLOGS OR SEEPAGE. MAINTAIN AS NEEDED TO KEEP THE WORKING AREA DRY.
10. REMOVE IMPOUNDMENT AND SLOPE DRAIN WHEN WORK ON DOWNSTREAM SECTION IS COMPLETED AND STABILIZED.
11. DRAIN OR PUMP OUT AS MUCH WATER AND ACCUMULATED SEDIMENT AS POSSIBLE FROM BEHIND THE IMPERVIOUS DIKE BEFORE BEGINNING ITS REMOVAL.
12. RESHAPE AND STABILIZE BANKS AND CHANNEL BED AT SITE OF IMPOUNDMENT AND SLOPE DRAIN.

SEQUENCE OF CONSTRUCITON FOR UT3 RESTORATION:
1. INSTALL SEDIMENT FENCE AROUND STOCKPILE AND STAGING AREAS.
2. REMOVE EXISTING BERM ALONG LEFT SIDE OF UT3. STOCKPILE EXCAVATED MATERIAL TO USE AS FILL FOR THE RESTORATION ABOVE STA. 2+00, AND TO FILL PORTIONS OF THE ABANDONED CHANNEL SECTION BELOW STA. 2+00
3. EXCAVATE NEW CHANNEL IN THE DRY FROM STA. 2+00 TO CONFLUENCE WITH SOUTH HOMINY CREEK. STOCKPILE EXCAVATED MATERIAL.
4. INSTALL IN–STREAM STRUCTURES, SEED STRAW & EROSION CONTROL MATTING FROM STA. 2+00 TO SOUTH HOMINY CREEK.
5. INSTALL PLUG OF ABANDONED UT3 CHANNEL JUST BELOW STA. 2+00. AS DESCRIBED IN DETAL 1 OF SHEET 19.
6. INSTALL TEMPORARY IMPERVIOUS DIKE AT LOCATION IMMEDIATELY UPSTREAM OF EXISTING FORD/CATTLE CROSSING.
7. INSTALL TEMPORARY SLOPE DRAIN (APPROX. 250 LF OF MIN. 4"ø HDPE CORRUGATED PIPE) ON GRADE FROM IMPERVIOUS DIKE TO RESTORED SECTION OF UT3 BELOW STA. 2+00 TO BYPASS WORKING AREA FROM STA. 0+00 TO 2+00.
8. RAISE EXISTING BED OF UT4 (0+00 TO 2+00) ACCORDING TO PROPOSED PROFILE USING STOCKPILED. INSTALL BOULDER STEP STRUCTURES, COBBLE FOR BED. APPLY SEED, STRAW & EROSION CONTROL MATTING.
9. CONSTRUCT IMPROVED FORD/LIVESTOCK CROSSING IMMEDIATELY UPSTREAM OF STA. 0+00 AS PER DETAIL 2 OF SHEET 12.
10. DRAIN OR PUMP OUT WATER IMPOUNDED BEHIND IMPERVIOUS DIKE. REMOVE ANY ACCUMULATED SEDIMENT.
11. REMOVE IMPERVIOUS DIKE AND SLOPE DRAIN PIPE. RESHAPE AND STABILIZE CHANNEL BED AND BANKS AT SITE OF IMPOUNDMENT.
12. USE SELECT MATERIAL FROM STOCKPILE TO FILL SECTIONS OF THE ABANDONED UT4 CHANNEL BELOW STA. 2+00 WHERE DIRECTED BY NCWRC STAFF. WHEN STOCKPILE IS EXHAUSTED, STABILIZE REMAINING UNFILLED SECTIONS OF ABANDONED UT3 TO ESTABLISH LOW VERNAL POOLS ADJACENT TO THE NEW CHANNEL.

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

EROSION & SEDIMENT CONTROL PLAN
UT3 TEMPORARY DIVERSION

Prepared for:
Ecosystem Enhancement Program
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Seeding & Live Stakes

Type	Common Name	Scientific Name	Rate	Zones	Number
Annual seed	Annual rye	*Lolium multiflorum*		1,2,3	
	Browntop millet	*Panicum ramosum*		1,2,3	
		Total	60 Lb./Ac.		
Perennial native seed	American bur-reed	*Sparganium americanum*		1,2,3	
	Arrow Arum	*Peltandra virginica*		4	
	Arrow-leaved tearthumb	*Polygonum sagittatum*		1,2,3	
	Big bluestem	*Andropogon gerardii*		1,2,3	
	Blue vervain	*Verbena hastata*		1,2,3	
	Deer tongue	*Panicum clandestinum*		1,2,3	
	Green bulrush	*Scirpus atrovirens*		1,2,3	
	Hop sedge	*Carex lupulina*		1,2,3,4	
	Indian wood oats	*Chasmanthium latifolium*		1,2,3	
	Indiangrass	*Sorghastrum nutans*		1,2,3	
	Lance leaved coreopsis	*Coreopsis lanceolata*		1,2,3	
	Little bluestem	*Schizachyrium scoparium*		1,2,3	
	Many leaved bulrush	*Scirpus polyphyllus*		1,2,3	
	Nodding bur-marigold	*Bidens cernua*		1,2,3	
	Ox eye sunflower	*Heliopsis helianthoides*		1,2,3	
	Partridge pea	*Chamaecrista fasciculata*		1,2,3	
	Purple cone flower	*Echinacea purpurea*		1,2,3	
	Showy evening primrose	*Oenothera speciosa*		1,2,3	
	Smooth panic grass	*Panicum dichotomiflorum*		1,2,3	
	Soft rush	*Juncus effusus*		1,2,3,4	
	Softstem bulrush	*Scirpus validus*		1,2,3,4	
	Switch grass	*Panicum virgatum*		1,2,3	
	Virginia wild rye	*Elymus virginicus*		1,2,3	
		Total	15 Lb./Ac.		
Live stakes	Ninebark	*Physocarpus opulifolius*		1,4	1,600
	Silky dogwood	*Cornus amomum*		1,4	3,000
	Silky willow	*Salix sericea*		1,4	1,600
		Total	1/S.Y. (Min.)		6,200

LIVE STAKE NOTES:

1. Live stakes shall be installed during the dormant season (November through April). Stakes harvested on-site should be planted on the same day. Reject any split stakes.
2. Cut 0.5"-2"Ø stakes to 2'-3' lengths. Buds will point up. Cut bottoms at 30°-45° angles. Cut tops flat.
3. Store stakes with ends down in buckets at least half full of water during transport and planting.
4. Install stakes perpendicular to the plane of the bank in a diamond pattern spaced 2'-3' apart.
5. Live stakes should be pushed into the bank by hand or driven by a rubber mallet. Pre-drilling or reaming holes for live stakes may result in air voids that will dry out roots, and should be avoided.
6. Approximately $\frac{3}{4}$ of the planted stake should be in the ground. The top $\frac{1}{4}$ should extend through and above any erosion control matting.

Woody Vegetation Plantings

Common Name	Scientific Name	Zones	Plant Size	Material Type	Number
Alleghany serviceberry	*Amelanchier laevis*	3	Med. Tree	Potted	20
American beech	*Fagus grandifolia*	3	Large Tree	Potted	20
American hazelnut	*Corylus americana*	3	Shrub	Potted	20
American holly	*Ilex opaca*	3	Med. Tree	Potted	20
American hornbeam	*Carpinus caroliniana*	2,3	Med. Tree	Potted	20
American mountain ash	*Sorbus americana*	3	Med. Tree	Potted	20
Arrowwood viburnum	*Viburnum dentatum*	2,3	Shrub	Potted	20
Black cherry	*Prunus serotina*	3	Med. Tree	Potted, Bare Root	20, 100
Black gum	*Nyssa sylvatica*	3	Large Tree	Potted	100
Black willow	*Salix nigra*	1,2,4	Med. Tree	Potted	80
Blueberry	*Vaccinium corymbosum*	2,3	Shrub	Potted	20
Button bush	*Cephalanthus occidentalis*	1,2,4	Shrub	Potted	100
Crabapple	*Malus angustifolia*	3	Med. Tree	Bare Root	100
Dog hobble	*Leucothoe fontanesiana*	2,3	Shrub	Potted	20
Dogwood	*Cornus florida*	3	Med. Tree	Bare Root	100
Eastern redbud	*Cercis canadensis*	3	Med. Tree	Bare Root	100
Eastern sweetshrub	*Calycanthus floridus*	3	Shrub	Potted	20
Elderberry	*Sambucus canadensis*	1,2	Shrub	Potted	40
Flame azalea	*Rhododendron calendulaceum*	3	Shrub	Potted	20
Ironwood	*Ostrya virginiana*	2,3	Med. Tree	Potted	20
Maple leaf viburnum	*Viburnum acerifolium*	3	Shrub	Potted	20
Mockernut hickory	*Carya tomentosa*	3	Large Tree	Bare Root	100
Northern red oak	*Quercus rubra*	3	Large Tree	Potted, Bare Root	20, 100
Pawpaw	*Asimina triloba*	2,3	Shrub	Potted	20
Persimmon	*Diospyrus virginiana*	3	Med. Tree	Potted, Bare Root	20, 100
Pignut hickory	*Carya glabra*	3	Large Tree	Bare Root	100
Possum haw	*Ilex decidua*	2	Shrub	Potted	20
Red chokeberry	*Aronia arbutifolia*	2	Shrub	Potted	40
Rhododendron	*Rhododendron maximum*	2,3	Shrub	Potted	20
River birch	*Betula nigra*	2	Med. Tree	Potted, Bare Root	20, 100
Scarlet oak	*Quercus coccinea*	3	Large Tree	Bare Root	200
Sourwood	*Oxydendrum arboreum*	3	Med. Tree	Bare Root	100
Spicebush	*Lindera benzoin*	2,3	Shrub	Potted	20
Sweet azalea	*Rhododendron arborescens*	2	Shrub	Potted	20
Sycamore	*Platanus occidentalis*	2	Large Tree	Bare Root	200
Tag alder	*Alnus serrulata*	2	Shrub	Potted	20
Virginia sweetspire	*Itea virginica*	2	Shrub	Potted	20
White oak	*Quercus alba*	3	Large Tree	Potted, Bare Root	20, 100
Wild plum	*Prunus americana*	3	Med. Tree	Bare Root	200
Winterberry	*Ilex verticillata*	2	Shrub	Potted	20
Witch hazel	*Hamamelis virginiana*	3	Shrub	Potted	20
Yellow buckeye	*Aesculus octandra*	2,3	Large Tree	Potted	40
Yellow root	*Xanthorhiza simplicissima*	1,2	Shrub	Potted	20

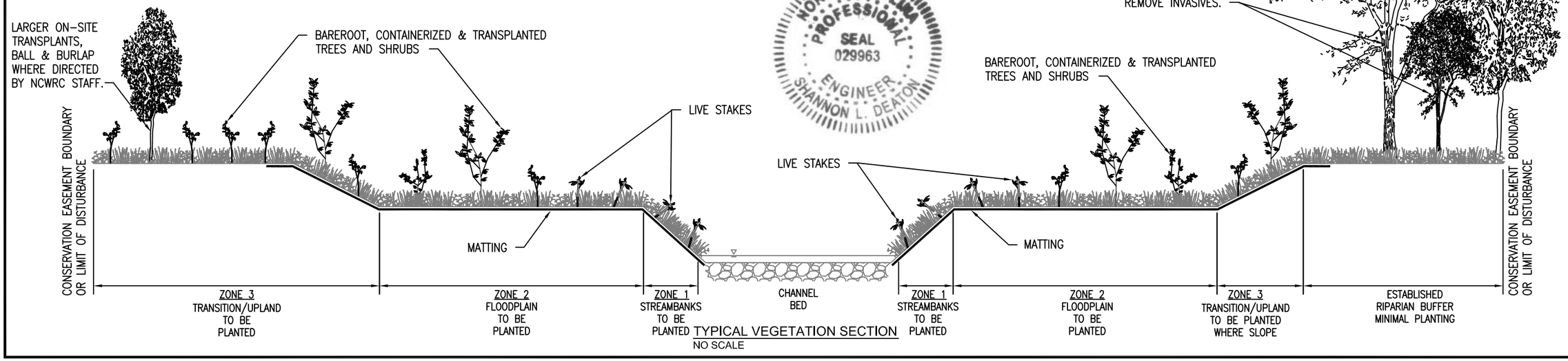
BANK & FLOODPLAIN PLANTING NOTES:

1. Bank and floodplain vegetation shall be planted during the dormant season (November through April). Transplants from on-site shall be replanted on the same day.
2. Bare Root Tree Planting:
   a. Roots must be kept moist during transport & planting. Reject any with dried out roots.
   b. Prune any damaged limbs. Reject any with majority of limbs broken or damaged.
   c. Dig holes with a dibble bar, mattock or spade. Holes should be deep and wide enough so that seedling will be planted with roots directed downward.
   d. Backfill holes with soil, and compress soil around seedlings.
   e. Water soon after planting to remove air pockets.
3. Planting Containerized Trees & Shrubs:
   a. Make a X cut in the matting large enough to dig a hole 8"-1' larger than the diameter of the container. Dig to a depth equal to the height of the container. If planted on a slope, planting spot should be dug so that top of root ball will be level.
   b. Remove tree/shrub from container. If root bound, make shallow, vertical cuts around sides of root ball and across the bottom to break up the root net before planting.
   c. Place planting in hole so that the top of the root ball is slightly higher than the surrounding grade. Tuck cut matting corners into hole.
   d. Refill half way with soil dug from hole. Water to remove air voids.
   e. Fill to cover the top of the root ball with soil.
   f. Use remaining soil to create a water retention ring around the planting. Water again.
   g. Cover planting mound and retention ring with straw mulch.
4. On-Site Transplants:
   a. Excavate transplants with a front end loader or excavator bucket depending on root depth. Get the entire root mass with soil intact if possible.
   b. Excavate a hole larger than the root ball of the transplant. Allow space for new root growth in a looser medium than the in-situ soil.
   c. Carefully place transplant into hole and stand plumb. Backfill and gently compress soil surrounding tree. Construct a water retention ring with any remaining soil.
   d. Water liberally and apply mulch over the mound and water retention ring.
   e. Stakes or other mechanical support should only be used when the tree is tall, slow to recover or planted in sandy soils. Any support should be removed as soon as the tree is able to stand on its own.
   f. Prune and provide protection from beaver as needed.

NOTE:

ALL PLANTING MATERIALS (SEED, LIVE STAKES & SEEDLINGS) SHALL BE SUPPLIED BY NCWRC OR SHALL BE TRANSPLANTED FROM ON-SITE SOURCES.

ZONE 4 = WETLAND ENHANCEMENT PLANTINGS
(AREAS DELINEATED ON PLAN)



TYPICAL VEGETATION SECTION
NO SCALE

NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

North Carolina Wildlife Resources Commission
Watershed Enhancement Group
20830 Great Smoky Mountain Expressway
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SOUTH HOMINY CREEK MITIGATION PLAN
BUNCOMBE COUNTY, NC

PLANTING LIST, INSTRUCTIONS & TYPICAL SECTION

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
Phone: 919.715.0476
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Project No. 92632

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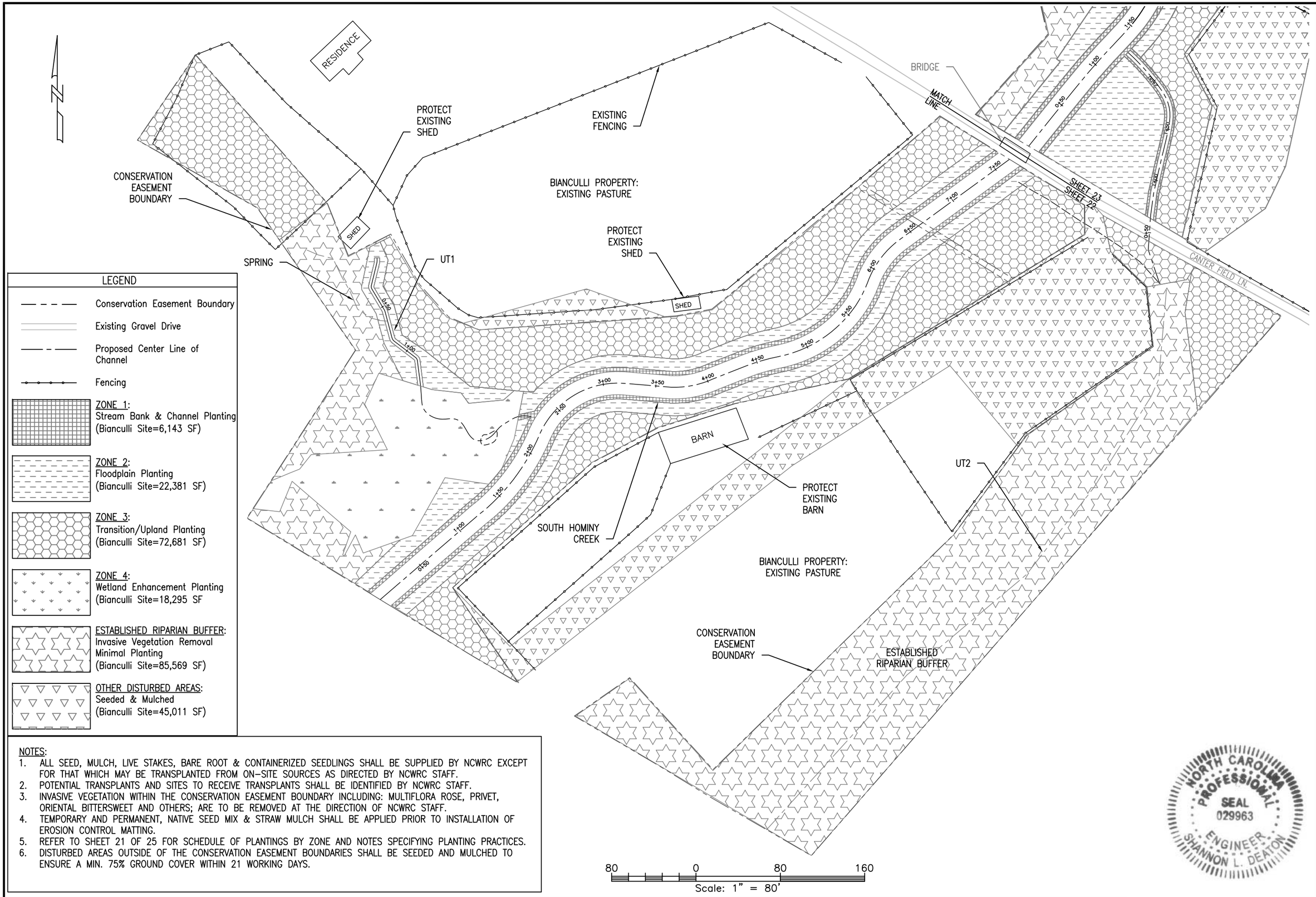

LEGEND

- Conservation Easement Boundary
- Existing Gravel Drive
- Proposed Center Line of Channel
- Fencing
- ZONE 1: Stream Bank & Channel Planting (Bianculli Site=6,143 SF)
- ZONE 2: Floodplain Planting (Bianculli Site=22,381 SF)
- ZONE 3: Transition/Upland Planting (Bianculli Site=72,681 SF)
- ZONE 4: Wetland Enhancement Planting (Bianculli Site=18,295 SF
- ESTABLISHED RIPARIAN BUFFER: Invasive Vegetation Removal Minimal Planting (Bianculli Site=85,569 SF)
- OTHER DISTURBED AREAS: Seeded & Mulched (Bianculli Site=45,011 SF)

NOTES:

1. ALL SEED, MULCH, LIVE STAKES, BARE ROOT & CONTAINERIZED SEEDLINGS SHALL BE SUPPLIED BY NCWRC EXCEPT FOR THAT WHICH MAY BE TRANSPLANTED FROM ON-SITE SOURCES AS DIRECTED BY NCWRC STAFF.
2. POTENTIAL TRANSPLANTS AND SITES TO RECEIVE TRANSPLANTS SHALL BE IDENTIFIED BY NCWRC STAFF.
3. INVASIVE VEGETATION WITHIN THE CONSERVATION EASEMENT BOUNDARY INCLUDING: MULTIFLORA ROSE, PRIVET, ORIENTAL BITTERSWEET AND OTHERS; ARE TO BE REMOVED AT THE DIRECTION OF NCWRC STAFF.
4. TEMPORARY AND PERMANENT, NATIVE SEED MIX & STRAW MULCH SHALL BE APPLIED PRIOR TO INSTALLATION OF EROSION CONTROL MATTING.
5. REFER TO SHEET 21 OF 25 FOR SCHEDULE OF PLANTINGS BY ZONE AND NOTES SPECIFYING PLANTING PRACTICES.
6. DISTURBED AREAS OUTSIDE OF THE CONSERVATION EASEMENT BOUNDARIES SHALL BE SEEDED AND MULCHED TO ENSURE A MIN. 75% GROUND COVER WITHIN 21 WORKING DAYS.

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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

PLANTING PLAN
BIANCULLI SECTION

Prepared for:
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NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

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Date:	13-DEC-10
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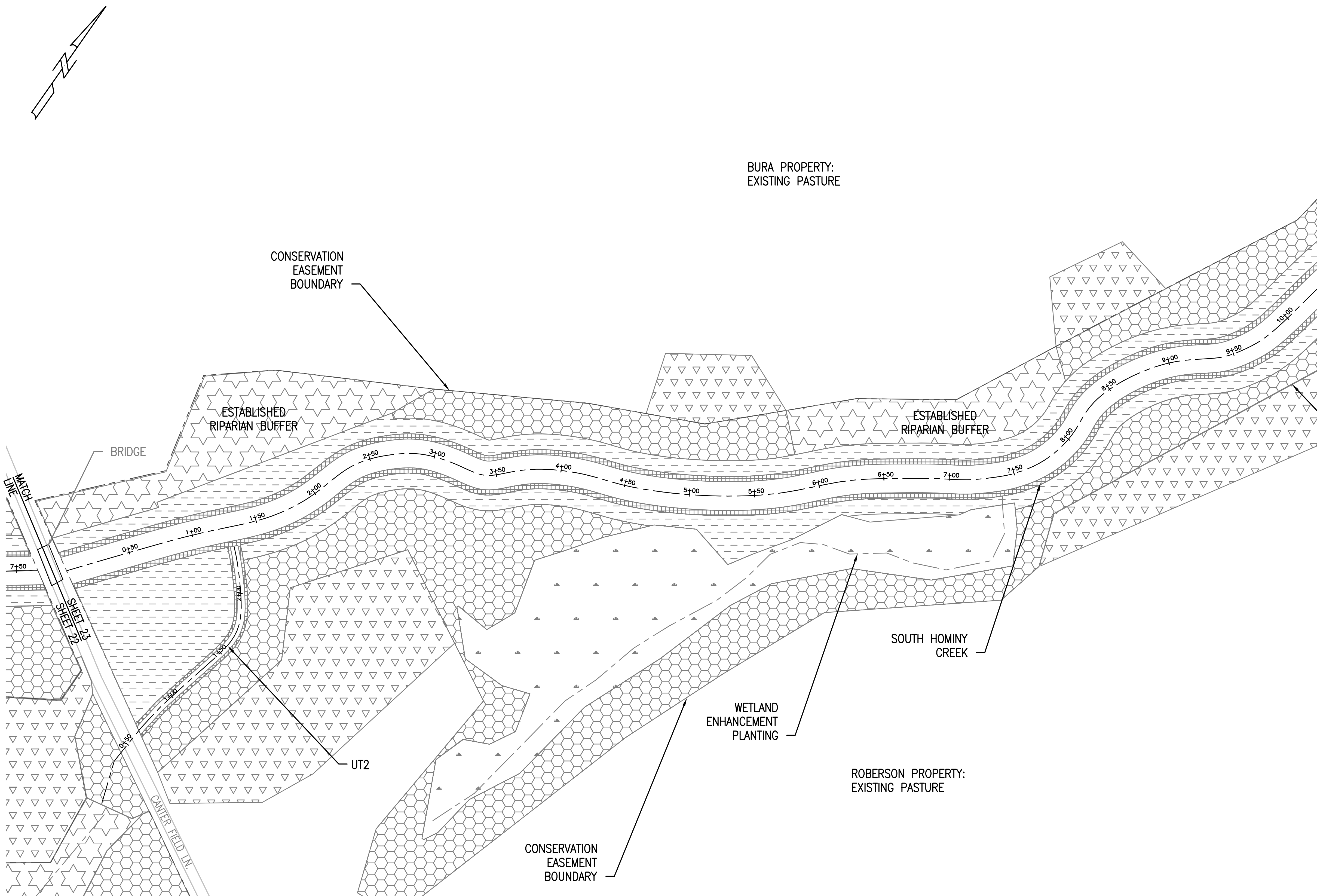

80 0 80 160

Scale: 1" = 80'

NOTES:

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NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

LEGEND

- Conservation Easement Boundary
- Existing Gravel Drive
- Proposed Center Line of Channel
- Fencing

ZONE 1: Stream Bank & Channel Planting (Bura/Roberson Site=10,868 SF)

ZONE 2: Floodplain Planting (Bura/Roberson Site=40,927 SF)

ZONE 3: Transition/Upland Planting (Bura/Roberson Site=77,254 SF)

ZONE 4: Wetland Enhancement Planting (Bura/Roberson Site=30,056 SF

ESTABLISHED RIPARIAN BUFFER: Invasive Vegetation Removal Minimal Planting (Bura/Roberson Site=20,485 SF)

OTHER DISTURBED AREAS: Seeded & Mulched (Bura/Roberson Site=54,015 SF)

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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

PLANTING PLAN
BURA/ROBERSON SITE

Prepared for:
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604
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Project No. 92632
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Drawn: JCF
Approved: SLD
Sheet No. 23 of 25

LEGEND

- Conservation Easement Boundary
- Existing Gravel Drive
- Proposed Center Line of Channel
- Fencing
- ZONE 1: Stream Bank & Channel Planting (Davis Site = 7,484 SF)
- ZONE 2: Floodplain Planting (Davis Site = 25,415 SF)
- ZONE 3: Transition/Upland Planting (Davis Site = 70,016 SF)
- ESTABLISHED RIPARIAN BUFFER: Invasive Vegetation Removal Minimal Planting (Davis Site = 140,573 SF)
- OTHER DISTURBED AREAS: Seeded & Mulched (Davis Site = 69,541 SF)

NOTES:
1. ALL SEED, MULCH, LIVE STAKES, BARE ROOT & CONTAINERIZED SEEDLINGS SHALL BE SUPPLIED BY NCWRC EXCEPT FOR THAT WHICH MAY BE TRANSPLANTED FROM ON-SITE SOURCES AS DIRECTED BY NCWRC STAFF.
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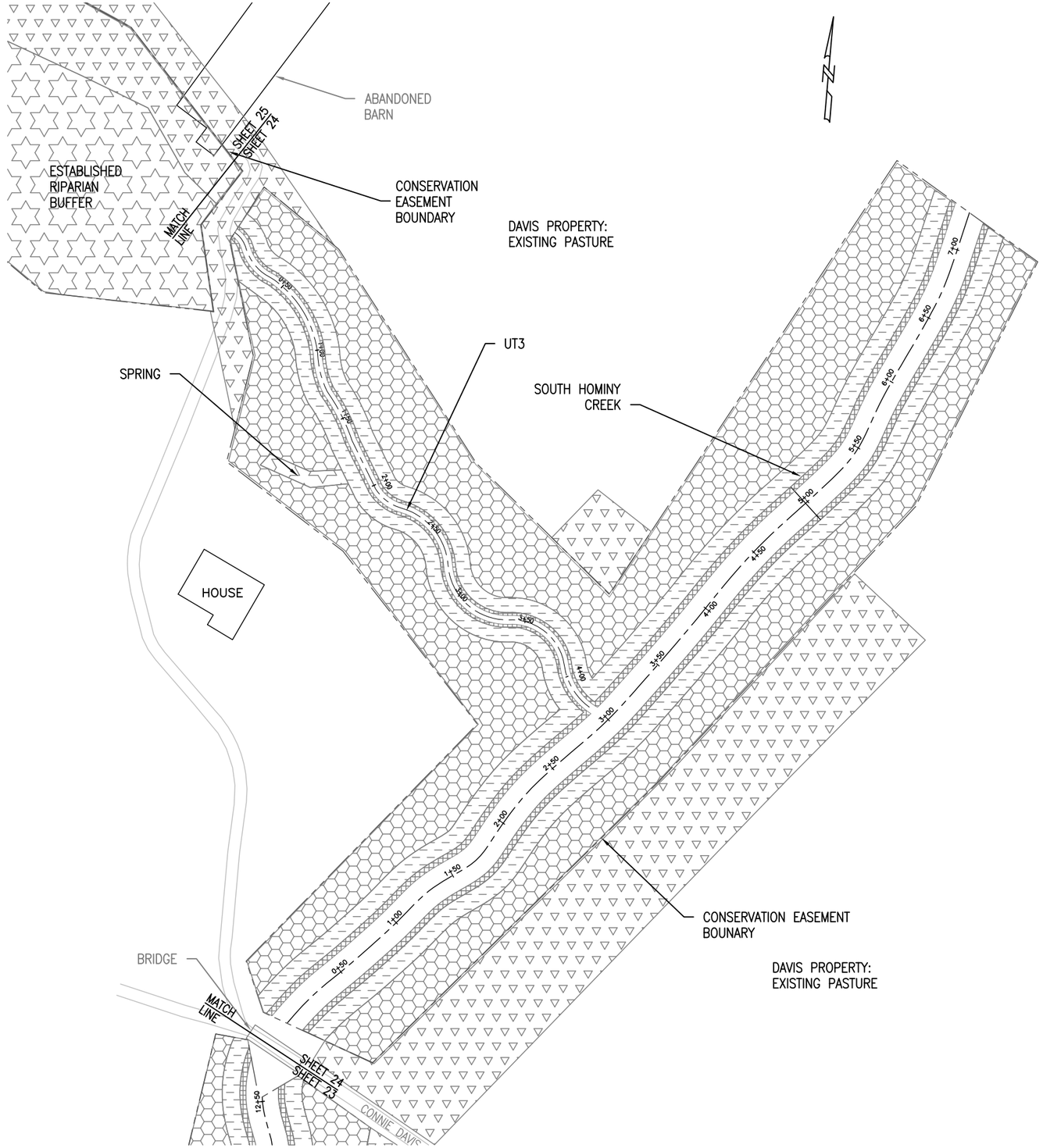

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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

PLANTING PLAN
DAVIS SECTION (LOWER)

Prepared for:
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NORTH CAROLINA PROFESSIONAL SEAL 029963 ENGINEER SHANNON L. DEATON

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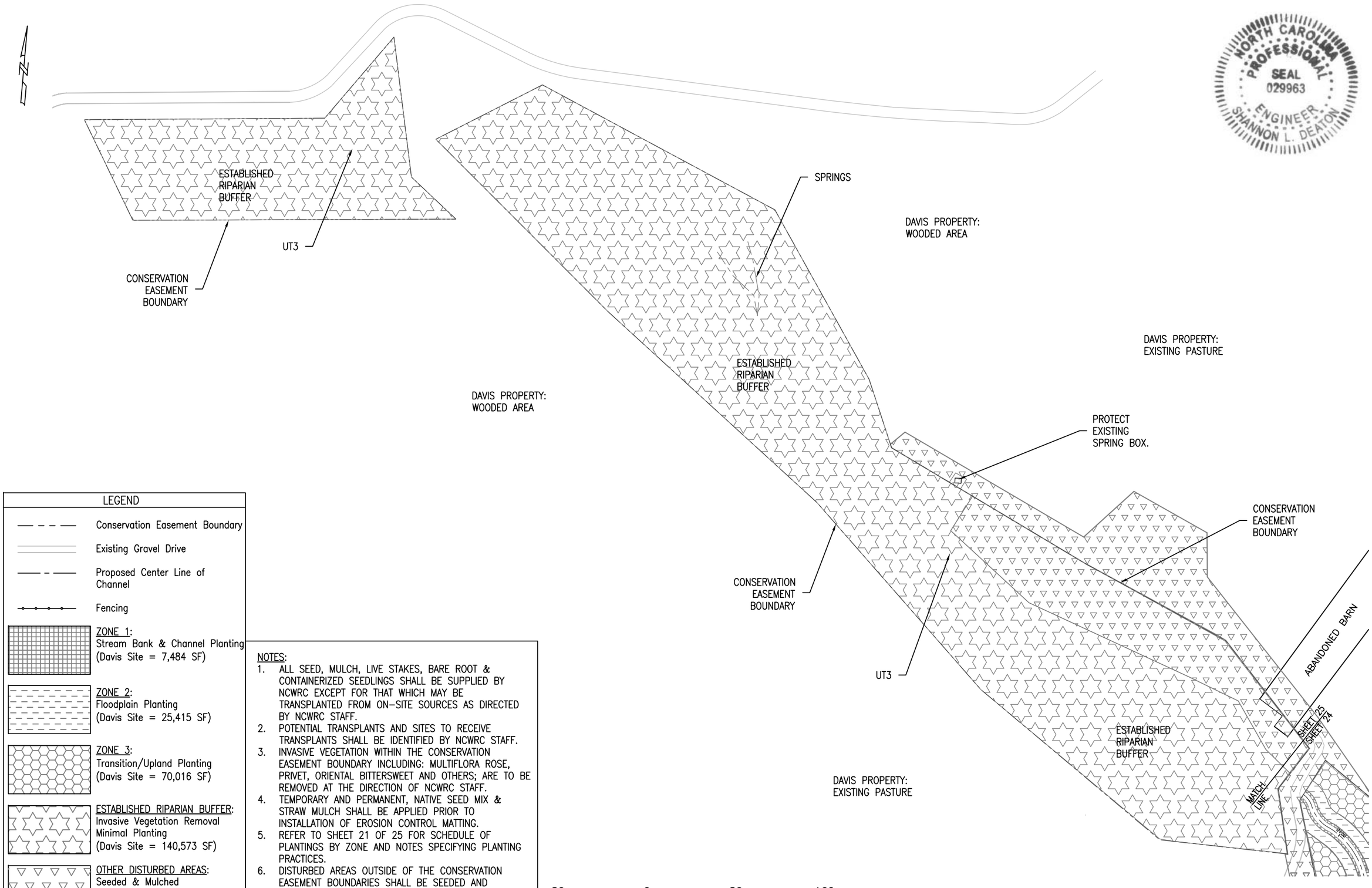

LEGEND

- Conservation Easement Boundary
- Existing Gravel Drive
- Proposed Center Line of Channel
- Fencing
- ZONE 1: Stream Bank & Channel Planting (Davis Site = 7,484 SF)
- ZONE 2: Floodplain Planting (Davis Site = 25,415 SF)
- ZONE 3: Transition/Upland Planting (Davis Site = 70,016 SF)
- ESTABLISHED RIPARIAN BUFFER: Invasive Vegetation Removal Minimal Planting (Davis Site = 140,573 SF)
- OTHER DISTURBED AREAS: Seeded & Mulched (Davis Site = 69,541 SF)

NOTES:

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SOUTH HOMINY CREEK MITIGATION PROJECT
BUNCOMBE COUNTY, NC

PLANTING PLAN
DAVIS SECTION (UPPER)

Prepared for:
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