STREAM RESTORATION PLAN

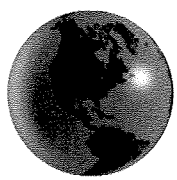
POTT CREEK II SITE
CATAWBA COUNTY, NORTH CAROLINA

Prepared for:

NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

September 15, 2004

Prepared by:



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1.0 Introduction

The Pott Creek II Stream Restoration Project (Pott Creek II Site) is part of HUC 03050102 located in Catawba County near Lincolnton, North Carolina (Figure 1). The Pott Creek II Site provides an opportunity to restore and preserve a substantial riparian zone on lands that have been historically used as pastureland. The restoration plan will include the stream restoration (including the dimension, pattern, and profile) of Pott Creek and four of its unnamed tributaries as well as Rhodes Mill Creek.

2.0 Goals and Objectives

The goals and objectives of this mitigation plan are:

- Provide a stable network of stream channels that neither aggrade nor degrade while maintaining their dimension, pattern, and profile with the capacity to transport the watershed's water and sediment load.
- Improve the overall downstream water quality by reducing the amount of sediment being produced by bank erosion, increased scour, and lack of overall riparian vegetation.
- Improve the aquatic habitat by reducing the silt and clay fines in the streambed caused by continual bank erosion and mass-wasting of the streambanks.
- Improve fish habitat with the use of natural material stabilization structures such a rock vanes, rootwads, and a riparian buffer.

Stream Mitigation Deliverables

This project will generate 10,054.0 Stream Mitigation Units (SMUs). The SMUs are determined by using the formulas [SMU = (Restoration/1.0) + (Enhancement Level I/1.5) + (Enhancement Level II/2.5) + (Preservation/5.0)]. A summary of the deliverables is presented in Table 1 below.

Table 1. Summary of Stream Mitigation Deliverables

Mitigation Type	Linear Feet	SMU Formula
Stream Restoration (Pott Creek main channel)	7209.0	7209.0
Stream Enhancement – Category I (Pott Creek main channel)	0	0
Stream Restoration (Rhodes Mill Creek)	1018.0	1018.0
Stream Restoration (Pott Creek unnamed tributaries)	1827.0	1827.0
TOTALS		**10,054.0**

3.0 General Location Information

Site Description

The Pott Creek II Site is located approximately five miles west of Maiden and eight miles southwest of Newton in southern Catawba County, North Carolina (Figure 1). It is characterized by a variable floodplain associated with Pott Creek which is bordered by moderately sloping terrain along both sides. Pott Creek transects the site in a southerly direction. Several tributaries of Pott Creek drain the majority of the area associated with the site. Elevations range from a high of 830 feet above mean sea level at the northern site boundary, north of Paint Shop Road, to a low of approximately 785 feet above mean sea level in the Pott Creek floodplain, downstream of the Paint Shop Road (SR 2023) crossing.

The primary land use within the study area is pastureland; however, limited forested lands occur along the eastern side of Pott Creek.

Site History

Based on the reconnaissance of the watershed, the existing channel associated with Pott Creek is both entrenched and unstable due to current and prior landuse activities. These activities include several occurrences of past channelization, removal and on-going maintenance of the riparian buffer, and continuous grazing. Channelization has been implemented at least twice along the Pott Creek II Site; first in the late 1800's and again in the early 1900's. Evidence of the latest extent of channelization (early 1900's) is noted on recent aerial photography. This channelization placed the center of the channel along the current property boundary between the Jarrett, Carter, Chucci, Propst, and Smith properties. The date of the latest channelization is unknown at the current time; however, interviews with the property owners indicate it was completed approximately 80 years ago. Historic aerial photographs from both the Natural Resources Conservation Service and Catawba County reveal the previous pattern of Pott Creek. The relic channel was located during the initial field reconnaissance. Sedimentation, fill material, and vegetation currently comprise the old channel. Based on the extremely long meander wavelengths and long radius of curvatures, this reach had been altered to its unnatural state prior to the turn of the 20th century.

Current Property Ownership

EarthMark companies, LLC (EarthMark) currently owns the Pott Creek II Site in its entirety. This property was created from portions of eight individually-owned parcels. With the exception of the northeastern site boundary, a minimum buffer width of 50 feet was purchased along both sides of the existing Pott Creek channel, its three unnamed tributaries and Rhodes Mill Creek. Additional buffer areas were purchased to ensure that the riparian corridor met the 50-foot buffer restriction in regard to areas where channel relocation is proposed. An aerial photograph denoting the site and its attributes is provided in Figure 2. Previous property owners include: Howard and Jo Jarrett, Maggie Carter, Richard and Jean Chucci and Rachel Sigman, Matthew Speagle, Billie Susan Propst, Randy and Susan Smith, Annette Hamrick, Michael and Samantha Hoyle, Michael and Robert Hoyle, and Rayford Crawley.

4.0 General Watershed Information

Pott Creek and its tributaries are part of the Catawba River Basin, situated within US Geological Survey (USGS) hydrological unit code (HUC) 03050102 and NC Division of Water Quality (NCDWQ) subbasin 03-08-35. Pott Creek enters the project site from the north and flows in a southerly direction approximately 6,900 linear feet across the site. Rhodes Mill Creek and several unnamed tributaries enter Pott Creek from both sides of the floodplain. Upstream of the site, Pott Creek collects surface hydrology from Cow Branch, Sampson Creek, Haas Creek and several unnamed tributaries. The calculated drainage area of Pott Creek as it enters the Pott Creek II Site is approximately 13.9 square miles (8,896 acres). Its drainage area increases to approximately 14.3 square miles (9,152 acres) downstream at the Paint Shop Road Bridge and to 19.7 square miles (12,696 acres) immediately downstream of the confluence with Rhodes Mill Creek at the southern property

boundary. Further downstream of the site, Pott Creek converges with Little Pott Creek prior to draining into the South Fork Catawba River and the Catawba River.

According to the North Carolina Department of Environment and Natural Resources (NCDENR, 1999), Pott Creek exhibits an Index of Biotic Integrity (NCIBI) rating of "Fair." This rating notes evidence of additional deterioration including the loss of intolerant species, fewer species, and a highly skewed trophic structure. The rating was issued in 1997 approximately one mile downstream of the Paint Shop Road stream crossing. Based on increases in sedimentation and lack of suitable in-stream habitat, this rating is likely in the "Poor-Fair" or "Poor" category. The surface water classification of Pott Creek and its tributaries is Class C, denoting freshwaters protected for aquatic life propagation/protection and secondary recreation (NCDENR, 2003). This classification is issued for the portion of Pott Creek beginning at its headwaters and continuing downstream through the site to approximately one mile downstream of Paint Shop Road. At this point, the creek is classified as Class WS-IV waters which are protected as water supplies generally in moderately to highly developed watersheds. No High Quality Waters (HQW), Water Supplies (WS-I or WS-II), or Outstanding Resource Waters (ORW) occur at or near the study area (NCDENR, 1999).

Landuse in the watershed is considered rural, with no known large areas of impervious surfaces commonly associated with urban development. Agricultural and pasturelands account for the majority of the surface area in the watershed, while forested sections exist along the streams and steep side sloping areas.

5.0 Description of Existing Conditions

Existing Hydrological Features

Pott Creek, Rhodes Mill Creek, and its tributaries were surveyed to determine specific geomorphological information outlined by the Rosgen stream classification system (Rosgen, 1996). These surveys included longitudinal profiles, cross sections, pebble counts, and bar samples of the existing channel. A summary of the geomorphic characteristics is included in the Attachments.

The streams found at the Pott Creek II Site have been impacted by channelization and dredging activities during the last two centuries. The land adjacent to the streams has been used for cattle grazing, thus allowing significant changes to occur with the stream, vegetation, and soils. The patterns and features found in natural, stable streams have been replaced with straightened, featureless channels.

Pott Creek and Rhodes Mill Creek both classify as G stream types under the Rosgen stream classification system and will be restored to a C stream type using a combination of Priority I and II restoration. The Pott Creek tributaries represent C/G stream types. These streams have been heavily impacted.

Geology

The Pott Creek II Site is located in the Piedmont physiographic province and underlain by the Inner Piedmont Belt, a region consisting of metamorphic rocks. According to the NC Division of Land Resources (NCDNR, 1985), the Pott Creek II Site is comprised of

amphibolite and biotite gneiss, which are interlayered with minor layers and lenses of hornblende gneiss, metagabbro, mica shist, and granitic rock. Narrow, rolling, interstream divides, intermixed with steeper slopes along well-defined drainage ways, characterize the landscape.

Soils

The soils underlying the site and adjacent areas are mapped as the Hiwassee association, comprised of gently sloping to moderately steep soils that have subsoil that is dominantly dark red, firm clay. This association is composed of approximately 70 percent Hiwassee soils and 30 percent soil of minor extent, including Cecil, Madison, Pacolet, Enon, Wilkes, and Appling soils on uplands, and the Congaree, Chewacla, and Wehadkee soils on floodplains (Brewer, 1975).

Based on the soil survey of Catawba County, Chewacla and Congaree soils dominate the site while the stream terraces and uplands consist mainly of Hiwassee soils (Figure 3). Chewacla soils are classified by the Natural Resources Conservation Service (NRCS) as fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts. These soils are somewhat poorly drained soils formed in recent alluvium on nearly level floodplains along streams that drain from the Mountains and Piedmont physiographic provinces. Slopes range from 0 to 2 percent. Chewacla soils are classified as Hydric B soils with inclusions of Wehadkee soils (Hydric A) in areas that are flooded for longer periods and exhibit anaerobic conditions. Congaree soils are classified as fine-loamy, mixed, active, nonacid, thermic Oxyaquic Udifluvents. They are deep, well to moderately well drained, moderately permeable loamy soils that formed in fluvial sediments. Congaree soils do not have a Hydric classification. Slopes range from 0 to 4 percent (NRCS, 2000).

Existing Vegetation and Invasive Species

The vegetation at the project site is separated into three major groupings: Piedmont Bottomland Forest, Pastureland and Piedmont Swamp Forest (Figure 4). These groupings are based primarily by topographical position and current land use.

Piedmont Bottomland Forest

The first grouping covers the vegetation found along the Pott Creek channel and subsequent eastern floodplain, as well as the small area south of Rhodes Mill Creek. This vegetation, consistent with the Shafale and Weakley's (1990) Piedmont Bottomland Forest classification, is sparse along the channel banks; however, it increases with density across the floodplain eastward. Dominant species include hackberry (*Celtis laevigata*), river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), and privet (*Ligustrum sinense*). Piedmont Bottomland Forests are generally situated on floodplain ridges and terraces other than active levees adjacent to the stream channel. They are underlain by various alluvial soils, including the Chewacla and Congaree series. These communities are flooded; however, they are seldom disturbed by flowing water. Bottomland forests are believed to form a stable climax forest, having an un-even aged canopy with primarily gap phase regeneration, although the possibility of unusually deep and prolonged flooding may make widespread mortality more likely than in uplands.

Pastureland

The second grouping pertains to the pasture area west of Pott Creek and north of Rhodes Mill Creek. This grouping consists of mainly herbaceous species including fescue (*Festuca* sp.) and other grasses and weeds. Soft rush (*Juncus* sp.) is present in the lower areas. Active cattle grazing restricts the overall diversity and composition of vegetation throughout this area.

Piedmont Swamp Forest

The third grouping is situated along the northwestern edge of the site. It is associated with the historical channel and is currently dominated by shrub-like vegetation. Tag alder (*Alnus serrulata*), black willow (*Salix nigra*), and soft rush (*Juncus effusus*) are dominant species in this community. This area is consistent with the Piedmont Swamp Forest classification (Shafale and Weakley, 1990). It is primarily underlain by fine to medium-textured alluvial soils, including the Wehadkee series. The hydrology is palustrine, seasonally to frequently flooded and may be flooded for long periods, as is the case at the Pott Creek II Site.

Invasive, or non-native species, are prevalent across the project site in the areas not affected by grazing. Species including privet and Japanese honeysuckle (*Lonicera japonica*) were observed throughout the eastern portion of the floodplain, while other species such as multiflora rose (*Rosa multiflora*) were observed along the stream banks and in the pasture areas. Box elder (*Acer negundo*), a native, highly competitive species, was noted across the floodplain in the areas not affected by grazing.

Jurisdictional Streams and Wetlands

Pott Creek, Rhodes Mill Creek, and the unnamed tributaries meet the jurisdictional definitions for perennial streams. The North Carolina Administrative Code provides a working definition for perennial streams. Perennial streams have water flowing in a well-defined channel for a majority of the year (greater than 90 percent of the time) (NCAC, 1999).

Jurisdictional wetland determinations were performed using the three-parameter approach as prescribed in the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). Jurisdictional wetlands exist intermittently throughout the Pott Creek floodplain. These wetlands have been identified and located on base maps. The restoration of Pott Creek and its tributaries including Rhodes Mill Creek will not impact these wetlands.

Cultural Resources

A review of properties to be determined eligible for the National Register of Historic Places at the State Historic Preservation Office (SHPO) was conducted for the study area and surrounding areas. According to the files, there are no National Register properties within a one-mile radius of the study area. In addition, the SHPO Archaeological Section was contacted in order to determine if documented archaeological sites occur at or near the study area. No sites were identified within a one-mile radius of the study area. A Phase I survey has been completed to ensure that no archaeological sites exist within the project area. An Archaeological Survey is included as an addendum to this plan. The Archaeological Survey indicates no archaeological findings and has been submitted to the SHPO office. This survey, as well as the SHPO's Section 106 clearance letter agreeing with the survey's findings is included in the addendum.

Protected Species

According to the US Fish and Wildlife Service (USFWS), there is one threatened species (dwarf-flowered heartleaf) and two federal species of concern (Catawba crayfish ostracod and sweet pinesap) potentially occurring in Catawba County (Addendum). In addition, The NC Natural Heritage Program (NCNHP) identifies one threatened species (bald eagle), and five species of special concern as also potentially occurring in the county. A review of the NCNHP database of documented occurrences did not reveal the presence of any of the aforementioned species within a one-mile radius of the site. Field investigations did not identify suitable habitat for the dwarf-flowered heartleaf (*Hexastylis naniflora*), sweet pinesap (*Monotropsis odorata*), bald eagle (*Haliaeetus leucocephalus*), or the Catawba crayfish ostracod (*Dactyloctythere isabelae*).

A letter dated March 30, 2004 from Brian Cole, USFWS, concurred there were no known locations of any federally listed species in the immediate project area. This letter is included in the addendum. However, he requested the opportunity to review future plans and recommended a survey for dwarf-flowered heartleaf (*Hexastylis nanaflora*) given that several occurrences of the plant are known to occur in the vicinity of the Pott Creek II Site. Since receiving this letter, it has been determined suitable habitat for the dwarf-flowered heartleaf will not be impacted by project implementation and a survey for this species will not be needed.

A letter dated March 31, 2004 from Harry LeGrand, NCNHP concurred that no known federal or state protected species or their critical habitats occur within 1.0 mile of the Pott Creek II Site. A copy of this concurrence letter is provided in the Addendum.

The following information summarizes the evaluation for protected species at the project site. The federally listed species are described in detail and formal conclusions are issued. The federal species of concern and state listed species are summarized in Table 2.

Dwarf-flowered heartleaf (*Hexastylis naniflora*)
Federal Listing: Threatened
State Listing: Threatened

Description:

The dwarf-flowered heartleaf inhabits acidic sandy loam soils along bluffs and nearby slopes, hillsides and ravines, in boggy areas adjacent to streamheads and streams. It has the smallest flowers of any North American Hexastylis (most less than 0.4 inches in length), with narrow sepal tubes (never more than 0.28 inches wide). Its jug-shaped flowers range from beige to dark brown in color and are sometimes greenish or purplish. Dwarf-flowered heartleaf flowers mid-March to early June. Its leathery, evergreen leaves are dark green and heart-shaped. Soil type is the most important habitat requirement and the plant prefers Pacolet, Madison, or Musella soil types. It requires sunlight in early spring for maximum flowering and seed production.

Conclusion:

Based on the above-mentioned habitat requirements, the Pott Creek II Site does not provide the desired habitat for the dwarf-flowered heartleaf. Project construction will be limited primarily to the open, pasture areas at the site. A vegetative reconnaissance was done as part

of project requirements and did not note the presence/existence of any *Hexastylis* species. The NC Natural Heritage Program also does not have any documented occurrence of this species within a one-mile radius of the project site. Therefore, based on these conclusions, project implementation will not impact this species.

Bald eagle (*Haliaeetus leucocephalus*)
Federal Status: Proposed for de-listing
State Status: Threatened

Description:
The bald eagle is a large raptor. The characteristic adult plumage consists of a white head and tail with a dark brown body. Juvenile eagles are completely dark brown and do not fully develop the majestic white head and tail until the fifth or sixth year. Fish are the primary food source but bald eagles will also take a variety of birds, mammals, and turtles (both live and as carrion) when fish are not readily available. Adults average about three feet from head to tail, weigh approximately 10 to 12 pounds and have a wingspread that can reach seven feet. Generally, female bald eagles are somewhat larger than the males.

Breeding pairs of bald eagles unite for life or until the death of their mate. The breeding season varies throughout the U.S., but typically begins in the winter for the southern populations and progressively shifts toward spring the further north the populations occur. The typical nest is constructed of large sticks and lined with soft materials such as pine needles and grasses. The nests are very large, measuring up to six feet across and weighing hundreds of pounds. Many nests are believed to be used by the same pair of eagles year after year. Female eagles lay an average of two eggs; however, the clutch size may vary from one to three eggs. The eggs are incubated about 35 days. The young fledge 9 to 14 weeks after hatching and at approximately 4 months the young eaglets are on their own.

Conclusion:
Based on the above-mentioned habitat requirements, the Pott Creek II Site does not provide the desired habitat for the bald eagle. Project construction will be limited primarily to the open, pasture areas at the site. There are no large bodies of water in the vicinity and no potential nesting trees that provide a clear, open pathway to and from a feeding source. No large raptors were observed during any of the site visits and the NC Natural Heritage Program does not have any documented occurrences within a one-mile radius of the site. Therefore, based on these conclusions, project implementation will not impact this species.

Table 2. Federal Species of Concern and State Listed Species

Common Name	Scientific Name	Federal Status	State Status	Habitat Requirements	Availability of Suitable Habitat
Catawba Crayfish Ostracod	*Dactylocythere isabelae*	FSC	SR	Symbiotic on crayfish in Lyle Creek in Catawba drainage (endemic to North Carolina)	None
Dwarf Threetooth	*Triodopsis fulciden*		SC	Southwestern Piedmont (endemic to North Carolina)	None
Eastern woodrat	*Neotoma floridana haematoreia*		SC	Rocky places in deciduous or mixed forests, in southern mountains and adjacent Piedmont	None

Highfin Carpsucker	*Carpiodes velifer*		SC	Catawba, Pee Dee, and Cape Fear Rivers	None
Loggerhead shrike	*Lanius ludovicianus ludovicianus*		SC	Fields and pastures [breeding season only]	Present
Sweet Pinesap	*Monotropsis odorata*	FSC	SR-T	Dry forests and bluffs	None
Timber rattlesnake	*Crotalus horridus*		SC	Wetland forests in the Coastal Plain; rocky, upland forests elsewhere	None

Environmental Issues

The EarthMark Team obtained preliminary data from Environmental Data Resources, Inc. (EDR) regarding the potential for on-site or nearby sources of contamination. EDR maintains an updated database of current and historical sources of contamination. All storage tanks, whether above-ground or underground are identified, as well as superfund sites, landfills, hazardous waste sites, and other potential hazards. No sites exist on their database within a one-mile radius of the site. This report is on file.

The EarthMark Team conducted a visual reconnaissance for any Recognized Environmental Concerns (RECs) throughout the site. The term REC means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property (ASTM E1527-00). None were observed. No buildings, sheds, or other structures were noted at the Pott Creek II Site.

6.0 Reference Reach Analysis

Due to the existing unstable nature of most second, third and fourth order streams in the Piedmont physiographic province; only one reference reach was identified. The reference reach (UT to Fourth Creek) is situated in Iredell County, approximately 3 miles from Statesville (Figure 5).

UT to Fourth Creek is characterized as a 1st order stream and classifies as a rural C5 stream type. Specific morphological data is presented in the Attachments section. Its watershed is approximately 0.37 square miles and encompasses large tracts of undeveloped wooded land and rural home sites. The riparian corridor associated with this stream consists of native, woody vegetation. Dominant species included American beech (*Fagus grandifolia*), ironwood (*Carpinus caroliniana*), tulip poplar (*Liriodendron tulipifera*), flowering dogwood (*Cornus florida*), spice-bush (*Lindera benzoin*), white oak (*Quercus alba*), and Southern red oak (*Quercus falcata*). This stream was chosen due to its stable nature and relatively low bank-height ratios.

7.0 Stream Restoration Plan

Proposed Design

The restoration of Pott Creek will utilize a combination of natural channel design methodologies with limited soil bio-engineering applications. This restoration will utilize methods consistent with a Rosgen Priority Level II–type restoration. The Priority Level II restoration will involve construction of a new channel at the existing elevation to the west of

the existing channel. The Final Design and Typical Channel Sections can be found in the Attachments section. Advantages of the Priority II restoration include a decrease in bank height and streambank erosion, establishment of riparian vegetation to help stabilize the banks, establishment of a floodplain to help remove stress from the channel during flood events, improvement of aquatic habitat, abatement of wide-scale flooding of original land surface, reduction of sediment and easier downstream grade transition. The Priority II restoration also increases pattern, stabilizes the channel profile, reduces overall shear and restores the natural dimension. A Priority Level I restoration (reconnecting the channel to its historical floodplain) is not feasible due to the limited relief across the site and controlling outfall and inflow elevations. Approximately 7,209 linear feet of the channel will be restored and relocated consistent with C-type stream channels. The newly established floodplain will connect the historical floodplain via very low gradient slopes from the bankfull elevation outward.

An additional 1,827 linear feet of stream restoration will be completed on four tributaries that enter Pott Creek. The first unnamed tributary has been heavily degraded by cattle traffic and grazing. A Priority Level I restoration is proposed on this stream. The Priority Level I restoration is advantageous since it promotes re-establishment of the floodplain and a stable channel. It reduces bank height and streambank erosion, reduces overall land loss, raises the water table, decreases sediment, improves aquatic and terrestrial habitats, improves land productivity and improves aesthetics. The second and third tributaries enter from the east and are severely entrenched. Priority Level II restorations are proposed to restore the dimension, pattern and profiles. The fourth unnamed tributary flows eastward and lies immediately downstream of the confluence of Pott Creek and Rhodes Mill Creek. This tributary shows evidence of past dredging and channelization. A Priority Level I restoration is proposed on this stream which will allow the new channel to access the adjacent floodplain.

Rhodes Mill Creek will be restored by construction of a channel with a proper dimension, pattern and profile, yielding 1,018 linear feet of restoration. The stream will undergo a Priority Level II restoration at the upstream property limits, then transitioning into a Priority Level I restoration approximately half way through the reach. The slope of the new channel will be reduced until its bankfull elevation is consistent with the adjacent floodplain on either side.

Implementation will begin in the upper pasture area west of Pott Creek and continue downstream through the middle pasture. The existing berms and spoil piles adjacent to Pott Creek will be back-filled into the existing channel once the new channel is constructed and stabilized. Excavated material associated with the new channel will also be used to fill the existing channels on the project site. The elevation of the fill material will remain consistent with the ground level associated with the current floodplain. Surface hydrology will be reintroduced to the area via overbank flooding. Woody vegetation will be reestablished in these areas.

Pott Creek's eastern floodplain is currently forested with areas of jurisdictional wetlands. Minimal land disturbance is expected in this floodplain area.

A balanced cut/fill plan is proposed for the Pott Creek II Project. As a result, some areas of the existing channels may remain intact to provide vernal pool habitat and watering areas for terrestrial wildlife. The actual extent and location of these areas will be determined during construction.

Sediment Transport

A stable stream has the capacity to move its sediment load without aggrading or degrading. The total load of sediment can be divided into bedload and washload. Washload is normally composed of fine sands, silts and clay transported in suspension at a rate that is determined by availability and not hydraulically controlled. Bedload is transported by rolling, sliding, or hopping (saltating) along the bed. At higher discharges, some portion of the bedload can be suspended, especially if there is a sand component in the bedload. Bed material transport rates are essentially controlled by the size and nature of the bed material and hydraulic conditions (Hey and Rosgen, 1997).

The shear stress placed on the sediment particles is the force that entrains and moves the particles. The critical shear for the proposed channel has to be sufficient to move the D_{84} of the bed material. The critical shear stress was calculated and plotted on Shield's curve to determine the approximate size of particles that will be moved (See attachments). Based on Shield's curve, particles from 9 mm to 35 mm could be moved with an average value of 22 mm. The D_{84} of Pott Creek is 8.5 mm, while the D_{84} of Rhodes Mill Creek is 13 mm. The D_{100} of Pott Creek (27 mm) and Rhodes Mill Creek (34 mm) fell within the predicted values. Therefore, the proposed design has sufficient shear stress to move the bedload associated with both streams. Based on Shield's curve, the first unnamed tributary can move particles ranging from 8 mm to 18 mm. The D_{84} and D_{100} of the first unnamed tributary are 5.2 and 18 mm, respectively. Unnamed Tributaries two, three and four have bed material comprised of sand and silt. Critical shear stress analysis indicates excess shear at bankfull; however, the use of structures, channel pattern, and vegetation will maintain channel stability.

Flood Analysis

Portions of the Pott Creek II Site, including the channel of Pott Creek and its immediate floodplain are located within the Federal Emergency Management Association's (FEMA) approximate 100-year flood boundary, as depicted on Figure 6 (FEMA, 2004). These areas are inundated by the 100-year flood where base flood elevations have not been determined. The remainder of the site has not been mapped.

Approximate limits of flooding for the existing and proposed channels were determined using HEC-RAS software from the US Army Corps of Engineers Hydrologic Engineering Center. Water surface profiles for the 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year storm events were computed (See Attachments).

The proposed channels will raise flood stage in some portions of the reach, but mainly for 2 and 5-year storm events. This increase primarily occurs along Rhodes Mill Creek however; the property encompassing the entire site provides adequate flood storage and prevents any hydraulic trespass on adjacent property owners. This change in flood stage caused by the proposed channel for Rhodes Mill Creek is listed in the chart below.

Storm Event	Maximum Increase (feet)
2-year	0.5
5-year	0.2
10-year	0.0
25-year	0.0
50-year	0.0
100-year	0.0

Proposed Construction Sequence

Construction of the project will be carried out in two phases for maximum vegetation survival, channel stability, and sediment control requirements. During the first phase, the new channel sections of Pott Creek, its tributaries and Rhodes Mill Creek will be constructed and their adjacent buffer areas will be graded, ripped, and planted during the vegetation dormancy period. Stabilization structures, including cross vanes, j-hook vanes, single-arm rock vanes, and rootwads, will be placed within the new channel and all channel features will be constructed. Spoil material from all newly excavated channels will be stockpiled along the upland areas adjacent to the existing channels and stabilized with a temporary seed mix. Grading of the first phase is expected to be completed by November 2004. During early 2005 and once vegetation has become established, the second phase will be initiated. Flow from the existing channels associated with Pott Creek, its unnamed tributaries and Rhodes Mill Creek will be diverted into the new, stabilized channels. Clay plugs will be installed intermittently through sections of the old channel and the existing levees, spoil piles, and borrow material will be placed in the old channel. Removal of minor on-site vegetation is anticipated to reconnect the new floodplain with the existing terrace. Prior to April 2005, the newly restored floodplains will be planted with native vegetation based on the reference site and agency comments.

8.0 Typical Drawings

Four different structure types made of natural materials will be installed in the stream channels. These structures include single-arm rock vanes, j-hook rock vanes, cross vanes and rootwads. These will be composed of natural materials either on-site or from off-site locations. These details can be found in the Attachments.

Single-Arm Rock Vanes

These structures are designed to dissipate the secondary circulation cells which cause stress in the near bank region. They also force the thalweg away from the bank and towards the middle of the channel. These structures are placed on the outsides of meanderbends. Footer rocks are placed on one side of the channel bottom for stability. More rocks are then placed at an angle to the streambank, gradually inclining in elevation until they are located above the bankfull surface directly adjacent to the streambank.

J-Hook Rock Vanes

These structures are designed to dissipate the secondary circulation cells which cause stress in the near bank region. They also force the thalweg away from the bank and towards the middle of the channel. Similar in design to single-arm rock vanes, these structures are placed on the outsides of meanderbends. Footer rocks are placed on one side of the channel bottom for stability. More rocks are then placed at an angle to the streambank, gradually inclining in elevation until they are located above the bankfull surface directly adjacent to the

streambank. Additional rocks are placed in the channel to give the structure a "J" shape. These extra rocks are added to maintain the pool and provide additional fish habitat.

Cross Vanes

These structures serve to maintain the integrity and composition of the riffle while promoting scour along the center of the channel, away from the adjacent banks. The design shape is roughly that of the letter "U" with the apex situated on the upstream side in the riffle section. Footer rocks are placed in the channel bottom for stability. Rocks are then placed on the footer rocks in the middle of the channel at approximately the same elevation as the design streambed. Rocks are then placed at an angle to the stream bank on either side of the channel. These rocks gradually incline to the bankfull elevation. Water flowing downstream is forced over these rocks towards the middle of the channel on either side of the structure, effectively scouring a pool immediately downstream. Cross vanes are used primarily used for stabilization and grade control, but the structures also provide habitat.

Rootwads

The objectives of these structures are to: provide in-stream and overhead cover for aquatic organisms, including fish; provide shade, detritus and terrestrial insect habitat; and provide minimal protection of the streambank from erosion. Generally, a footer log and boulders are placed on the channel bottom and abut the streambank along the outside of the meanderbend. This provides support for the rootwad and stability (minimal) to the streambank. A large tree rootwad (or root-ball) is then placed on the streambank with additional boulders and rocks on either side for stability. Flowing water is deflected away from the bank and towards the center of the channel.

9.0 Stream Riparian Planting Plan

The planting plan for the riparian buffer of the Pott Creek II Site will provide post-construction erosion control and riparian habitat enhancement. The riparian buffer will include native species appropriate for the Piedmont physiographic province, which have been identified at the reference site and at the Pott Creek II Site. Native species of the area will be selected for local conditions found at the project site. Plants within the floodplain will be flood tolerant to accommodate for periodic flooding events throughout the year and in the long-term. A variety of shrubs and trees will be planted to provide cover and habitat for wildlife.

Shrubs and trees with extensive, deep rooting systems will assist in stabilizing the banks in the long term. Native grasses, transplants, and live stakes will be utilized at the site for immediate stabilization. Vegetation will be planted in layers similar to layers found at the local reference site. Vegetative layers will include a shrub edge-layer immediately adjacent to the stream and a forest canopy layer upslope of the shrub layer. Colonization of local herbaceous vegetation will also occur.

Trees and shrub species will include, but not be limited to species typical of the Piedmont physiographic province: river birch (*Betula nigra*), sugarberry (*Celtis laevigata*), persimmon (*Diospyros virginiana*), green ash (*Fraxinus pennsylvanica*), blackgum (*Nyssa sylvatica*), sycamore (*Platanus occidentalis*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), black willow (*Salix nigra*), tag alder (*Alnus serrulata*), ironwood (*Carpinus caroliniana*), buttonbush (*Cephalanthus occidentalis*), silky dogwood (*Cornus amomum*), spicebush (*Lindera benzoin*), silky willow (*Salix*

sericea) and yellow-root (*Xanthorhiza simplicissima*). Actual quantities of the woody vegetation will depend upon availability at the construction period. Locations of site-specific species are presented in the final designs.

The Pott Creek II Site will be stabilized with a native grass mix and erosion control matting along the new created streambanks. Silky dogwoods and black willows will be live-staked on the channel banks on four-foot centers throughout the entire length of the restored stream channels. Shrub species will be planted in staggered rows on the upslope on random eight-foot centers. Trees will be planted as bare root stock, tubelings, and/or containerized material on random eight-foot centers at a frequency of 680 stems per acre. Planting of species will utilize dormant plant stock and will be performed to the extent practicable between December 1st and March 15th.

Transplants, particularly alders, willows, and birches will be utilized in applicable areas where the stock is plentiful to provide immediate channel stabilization. The transplants will be strictly placed along the outsides of the meanderbends where increased shear stresses are anticipated. The overall number of transplants is not known at this time. Determinations will be made during the construction period as to which species will be selected for transplanting.

10.0 Stream Monitoring Plan

Monitoring will determine the degree of success the mitigation project has achieved in meeting the objectives of providing proper channel function and increased habitat quality. This monitoring data will provide the Ecosystem Enhancement Program (EEP) and resource agencies with evidence that the goals of the Pott Creek II project have been met. Monitoring of the site will include an assessment of geomorphology and riparian vegetation at least once each year for a total of five years. Monitoring reports will be submitted annually to the EEP by December of each year. The monitoring reports will include detailed analysis of the new stream and floodplain, plant survivability, photos, and photo location points as well as any problems and their respective remedial measures. In the event that success criteria are not met, remedial measures will be developed, submitted to the EEP and installed to achieve success.

Upon completion of the project, an as-built channel survey will be conducted. The survey will document the dimension, pattern, and profile of the restored channel. Permanent cross sections will be established at an approximate frequency determined by the EEP. The locations will be selected to represent approximately 50% riffle and 50% pool areas. The as-built survey will include photo documentation at all cross sections, a plan view diagram, a longitudinal profile, vegetation information and pebble counts. Since the restored channel of Pott Creek will extend nearly 6,000 linear feet, the profile will be conducted for approximately 3,000 linear feet; however, the entire reaches of both tributaries and Rhodes Mill Creek may be assessed.

Stream Channel Assessment

The EarthMark Team will evaluate the restored sections of Pott Creek and its associated tributaries in regard to overall channel stability. Since streams are considered as "active" or "dynamic" systems, restoration is achieved by allowing the channel to develop a stable dimension, pattern, and profile such that, over time, the stream features (riffle, run, pool,

glide) are maintained and the channel does not aggrade or degrade. Minor morphologic adjustments from the design stream are anticipated based on the correlation of reference reach data, excessive sediment deposition from upstream sources, and on-going changes in land use within the watershed.

Vegetation
Vegetation requirements state that 260 stems/acre must be viable for success after the five year monitoring period. Should the performance criteria outlined above not be met during the monitoring period, the EarthMark Team will provide the EEP with their remediation proposal, detailing corrective actions and/or maintenance actions proposed and an implementation schedule for said actions, planned to meet the criteria. Upon review and approval/modification of said corrective measures by the EEP and the regulatory agencies, the EarthMark Team will implement the necessary corrective measures.

Frequency
All monitoring reports will be submitted to the EEP's designated representative for coordination with the appropriate regulatory agencies on an annual basis. Reports will be submitted to the EEP by December 15 of each year. The year of construction will have two submittals, one being the As-Built drawings and the second being the First Year Annual Monitoring Report. It is understood that the EEP will coordinate any necessary monitoring report submittals with the regulatory agencies. If monitoring reports indicate any deficiencies in achieving the success criteria on schedule, a remedial action plan will be included in the annual monitoring reports. The EarthMark Team will be available to coordinate any agency site visits, both before and after restoration activities have been completed. Vegetative monitoring will be conducted during the summer months of each monitoring year.

Monitoring Data
Monitoring data for each monitoring year will consist of the following:

1. Stream Channel Assessment
   Channel stability

2. Vegetation Data
   Number of stems/acre of woody species
   Percent of survival of planted woody species
   Species composition, including non-dominants
   Quantitative measure of noxious species
   Overall condition of the planted species
   Photo reference locations of each plot

Reporting
Monitoring results will be documented on an annual basis, with the associated reports submitted to the EEP. Both the EarthMark Team and the EEP in coordination with the appropriate regulatory agencies will determine when the performance standards have been achieved at the Pott Creek II Site. If standards are not met, the EarthMark Team will perform appropriate remedial activities to satisfy the EEP.

Noxious Species

Noxious species will be identified within the restored areas and controlled so that none become dominant species or alter the desired community structure of the site. If noxious plants are identified as a problem at the site, the EarthMark Team will develop a species-specific control plan for approval by the EEP prior to implementation.

Through coordination with the EEP during the five-year monitoring period, the EarthMark Team, where necessary, will remove, treat, or otherwise manage undesirable plant or animal species, including physical removal, use of herbicides, live trapping, confining wires, or nets. Where necessary, the site will be fenced to keep cattle out of the mitigation areas.

All vegetation removal from the site shall be done by mechanical means only unless the EEP has first authorized the use of herbicides or algaecides for the control of plants in or immediately adjacent to the site.

11.0 Stream Success Criteria

Based on the Classification Key for Natural Rivers (Rosgen, 1996), restoration activities will ultimately result in the classification of a C-stream type for Pott Creek, its associated tributaries and Rhodes Mill Creek. These stream types are slightly entrenched, meandering, sand/small gravel dominated, riffle-pool channels with well developed floodplains. The riffle-pool sequence for this stream type averages five-to-seven bankfull channel widths in length. The streambanks are generally composed of sandy material, with stream beds exhibiting little difference in pavement and sub-pavement material composition. Rates of lateral migration are influenced by the presence and condition of riparian vegetation. The C-stream type, characterized by the presence of point bars and other depositional features, is very susceptible to shifts in both lateral and vertical stability caused by direct channel disturbance and changes in the flow and sediment regimes of the contributing watershed. As a result, stream success criteria will be based on overall stability. It is expected that natural channel adjustment will occur throughout the restored reaches; however, excessive adjustment and potential stream instability will be judged to be occurring if the width/depth ratio is measured to be greater than 15, the bank height ratio is greater than 1.4, radius of curvature ratio is less than 1.4 or the development of headcuts occur.

12.0 References

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US Department of Agriculture (USDA), Soil Conservation Service, 1991. Hydric Soils, Catawba County, North Carolina. Technical Guide Section II-A-2, June 1991.

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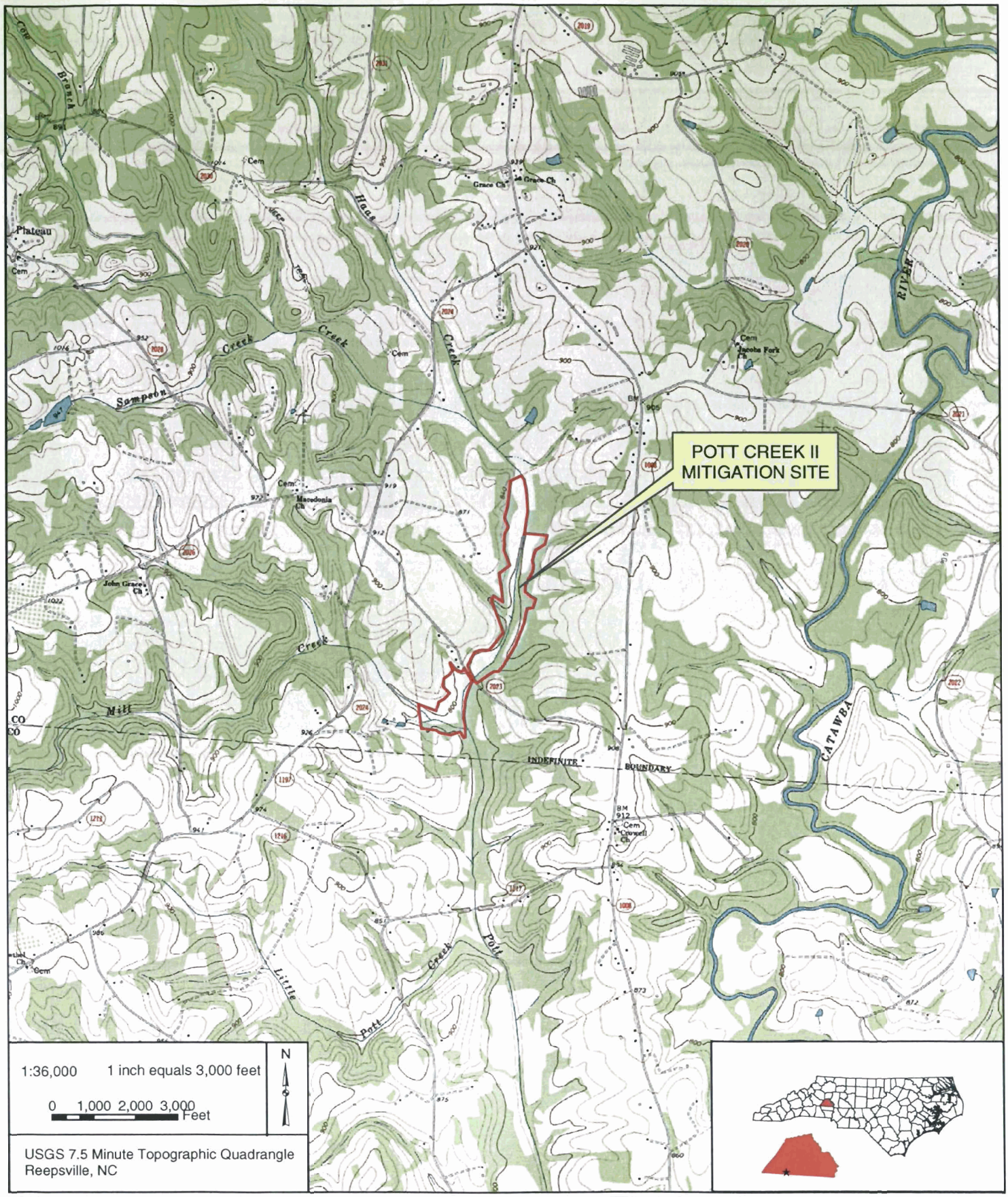
Figures



EarthMark companies

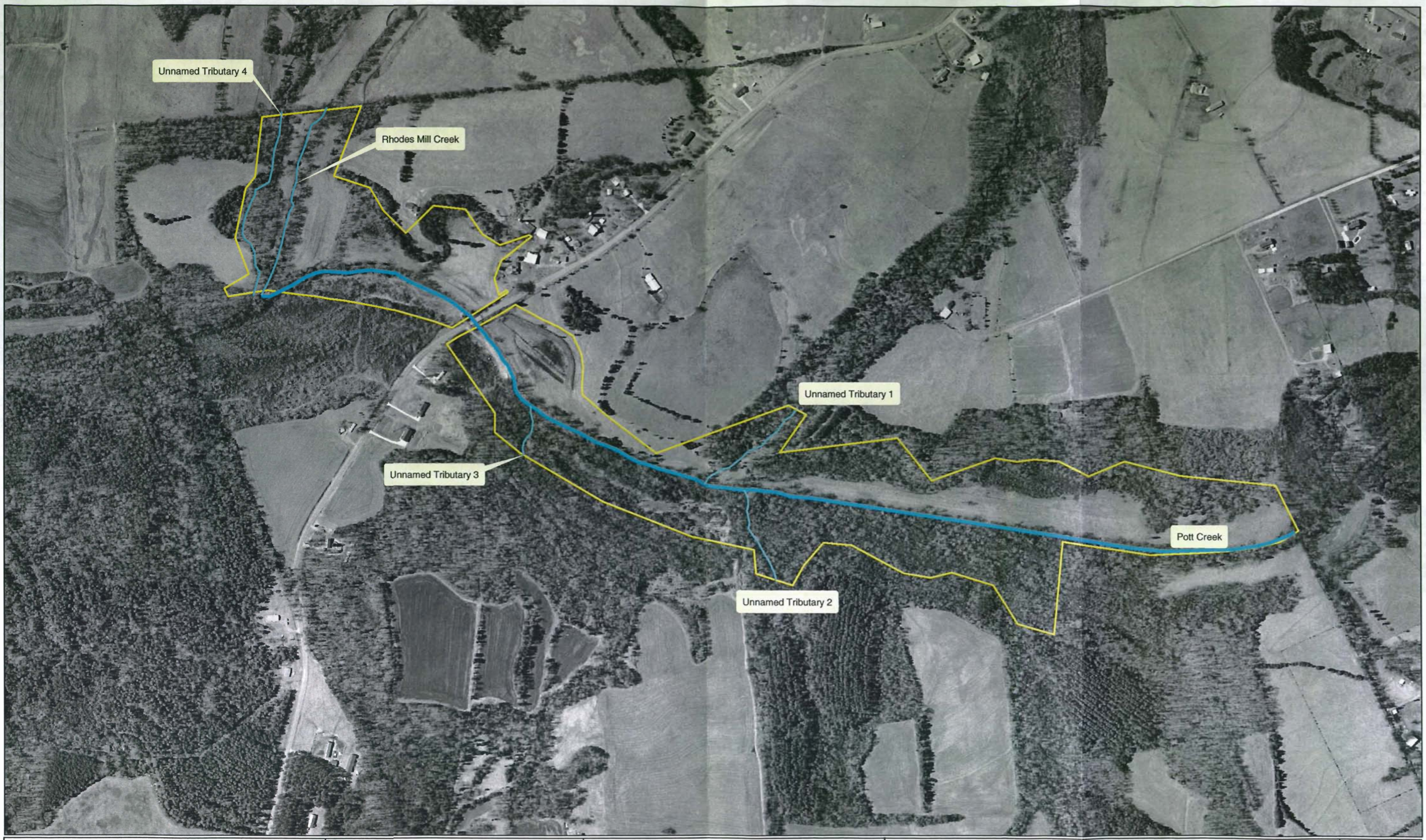
VICINITY MAP

POTT CREEK II MITIGATION SITE

CATAWBA COUNTY, NORTH CAROLINA

Figure No.

1



EarthMark companies

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0 250 500 750 1,000 Feet

Source: Catawba County GIS Dept.
2002 Aerial Photography

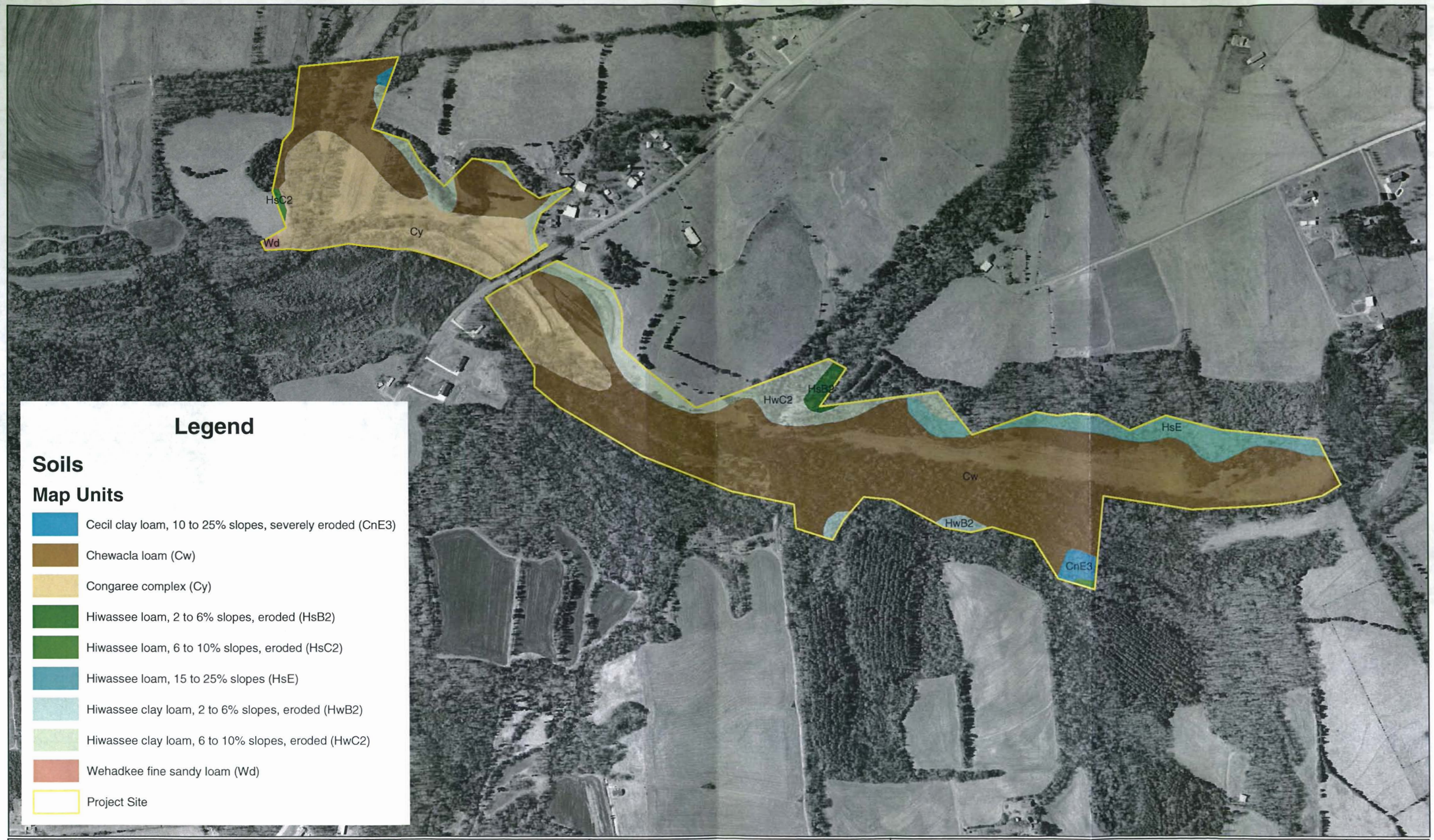
N

POTT CREEK II MITIGATION SITE

AERIAL PHOTOGRAPHY

CATAWBA COUNTY, NORTH CAROLINA

Figure 2



Legend

Soils

Map Units

- Cecil clay loam, 10 to 25% slopes, severely eroded (CnE3)
- Chewacla loam (Cw)
- Congaree complex (Cy)
- Hiwassee loam, 2 to 6% slopes, eroded (HsB2)
- Hiwassee loam, 6 to 10% slopes, eroded (HsC2)
- Hiwassee loam, 15 to 25% slopes (HsE)
- Hiwassee clay loam, 2 to 6% slopes, eroded (HwB2)
- Hiwassee clay loam, 6 to 10% slopes, eroded (HwC2)
- Wehadkee fine sandy loam (Wd)
- Project Site

EarthMark companies

1:6,000

0 250 500 750 1,000 Feet

Source: Catawba County GIS Dept.
2002 Aerial Photography

N

POTT CREEK II MITIGATION SITE

SOILS

CATAWBA COUNTY, NORTH CAROLINA

Figure 3

Legend

- Project Site
- Pastureland
- Piedmont Bottomland Forest
- Piedmont Swamp Forest

EarthMark companies

1:6,000

0 250 500 750 1,000 Feet

Source: Catawba County GIS Dept.
2002 Aerial Photography

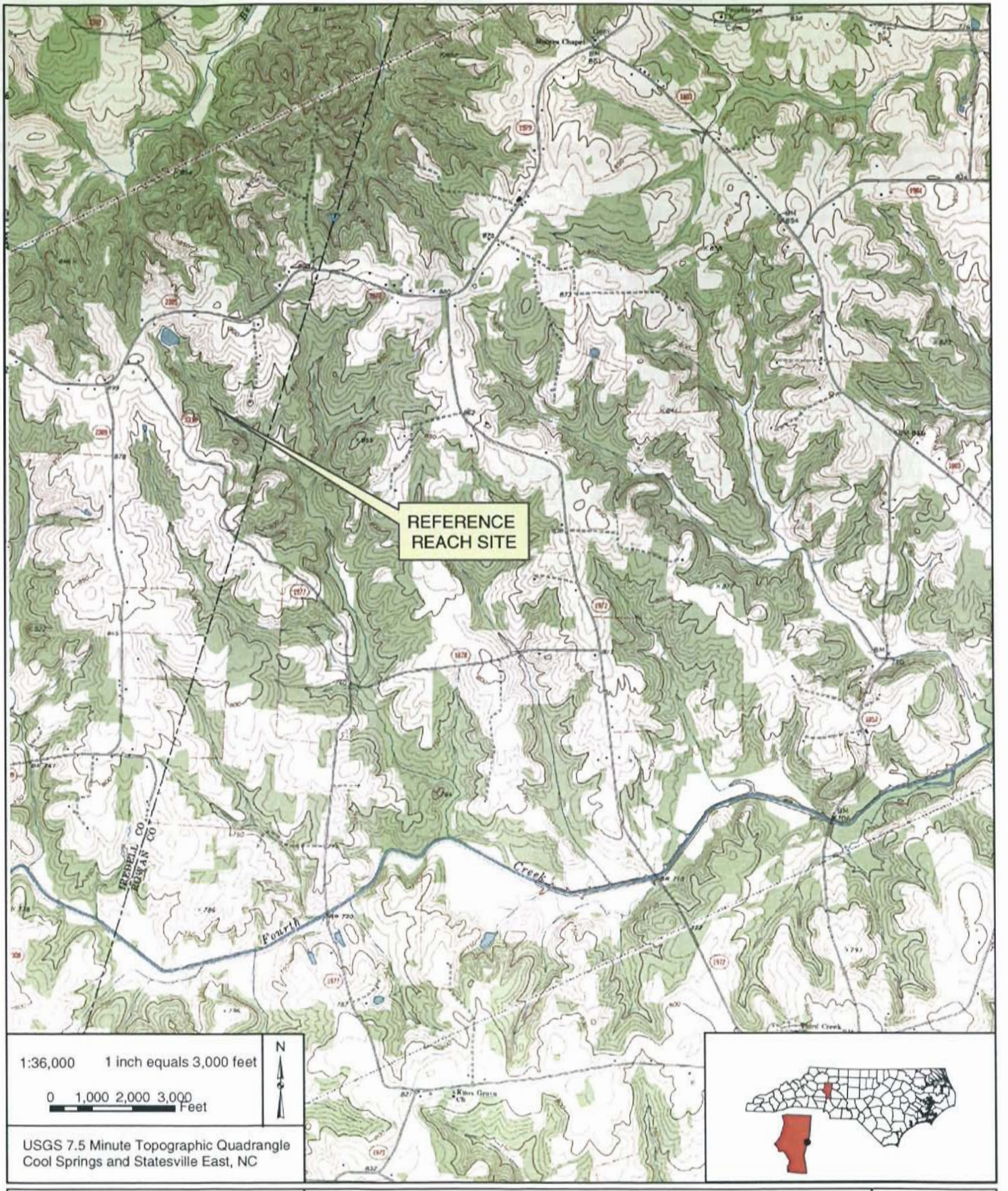
N

POTT CREEK II MITIGATION SITE

VEGETATIVE COMMUNITIES

CATAWBA COUNTY, NORTH CAROLINA

Figure 4



EarthMark companies

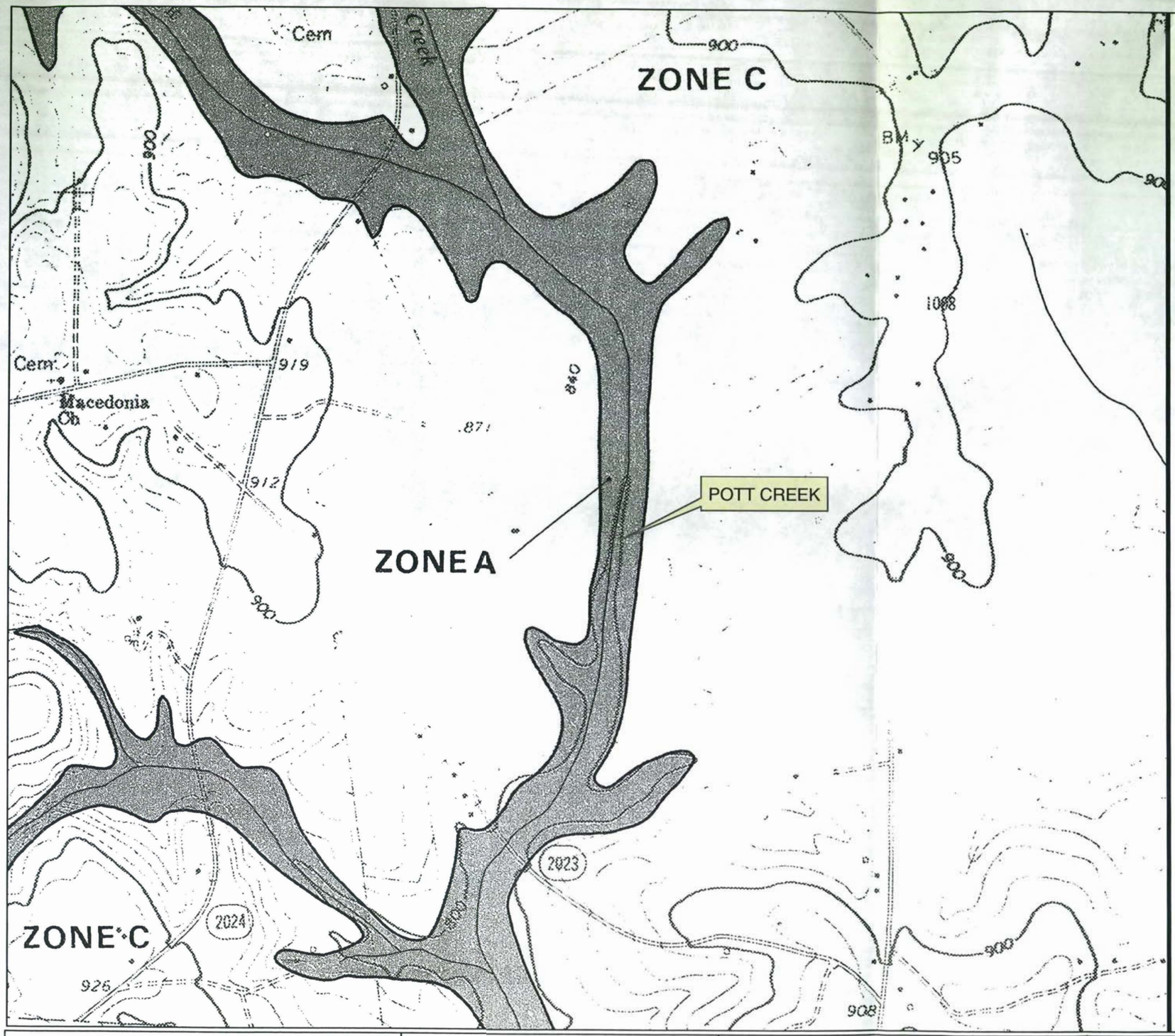
VICINITY MAP

REFERENCE REACH

IREDELL COUNTY, NORTH CAROLINA

Figure No.

5



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CATAWBA COUNTY, NORTH CAROLINA
(UNINCORPORATED AREAS)

PANEL 275 OF 350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
370050 0275 B

EFFECTIVE DATE:
SEPTEMBER 3,1980

EarthMark companies

Source: National Flood Insurance Program
Federal Emergency Management Agency

POTT CREEK II MITIGATION SITE
FLOOD MAPPING
CATAWBA COUNTY, NORTH CAROLINA

Figure 6

Attachments

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (Pott Creek)	Proposed Reach (Pott Creek)
1. Stream Type	**G5**	**C5**
2. Drainage Area (sq. mi)	**15**	**15**
3. Bankfull Width (Wbkf) ft	Mean: 23.3 Range: 15.0 - 30.0	Mean: 38 Range:
4. Bankfull Mean Depth (dbkf) ft	Mean: 5.02 Range: 4.4 - 7.0	Mean: 3.4 Range:
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 4.64 Range: 2.14 - 6.80	Mean: 11.2 Range:
6. Bankfull Cross-Sectional Area (Abkf) sq ft	Mean: 116.9 Range: 106.2 - 132.2	Mean: 130 Range:
7. Bankfull Mean Velocity (Vbkf) fps	Mean: 5.8 Range: 4.9 - 6.3	Mean: 4.61 Range: 4.4 - 5.0
8. Bankfull Discharge, (Qbkf) cfs	Mean: 679.5 Range: 518.2 - 824.1	Mean: 600 Range: 572 - 650
9. Maximum Bankfull Depth (dmax) ft	Mean: 5.9 Range: 5.0 - 6.9	Mean: 5.00 Range:
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 1.2 Range: 1.08 - 1.30	Mean: 1.0 Range:
11. Width of Flood Prone Area (Wfpa) ft	Mean: 300 Range:	Mean: 300 Range:
12. Entrenchment Ratio (Wfpa/Wbkf) sq ft	Mean: 12.9 Range: 10 - 20	Mean: 7.7 Range:
13. Meander Length (Lm) ft	Mean: N/A Range:	Mean: 312 Range: 161 - 576
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: N/A Range:	Mean: 8.2 Range: 4.2 - 15.2
15. Raduis of Curvature (Rc) ft	Mean: N/A Range:	Mean: 111.4 Range: 70 - 160
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: N/A Range:	Mean: 2.9 Range: 1.8 - 4.2
17. Belt Width (Wblt) ft	Mean: N/A Range:	Mean: 102.7 Range: 63 - 243
18. Meander Width Ratio (Wblt/Wbkf)	Mean: N/A Range:	Mean: 2.7 Range: 1.6 - 6.4
19. Sinuosity (Stream length/valley distance) (K)	Mean: 1.0 Range:	Mean: 1.14 Range:
20. Valley Slope (ft/ft)	Mean: 0.0013 Range:	Mean: 0.0015 Range:
21. Average Water Surface Slope or Bankful for Reach (Sbkf or Savg)=(Svalley/k) ft / ft	Mean: 0.0013 Range:	Mean: 0.00133 Range: 0.0008 - 0.00134

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (Pott Creek)	Proposed Reach (Pott Creek)
22. Pool Slope (Spool) ft / ft	Mean: N/A Range:	Mean: 0.00013 Range: 0.0 - 0.0002
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: N/A Range:	Mean: 0.1 Range: 0.0 - 0.2
24. Maximum Pool Depth (dpool) ft	Mean: N/A Range:	Mean: 9.00 Range:
25. Ratio of Maximum Pool Depth to Bankfull Depth (dpool/dbkf)	Mean: N/A Range:	Mean: 2.6 Range:
26. Pool Width (Wpool) ft	Mean: N/A Range:	Mean: 40.5 Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: N/A Range:	Mean: 1.07 Range:
28. Bankfull Cross-sectional Area at Pool (Apool) sq ft	Mean: N/A Range:	Mean: 185 Range:
29. Ratio of Pool Area to Bankfull Area	Mean: N/A Range:	Mean: 1.42 Range:
30. Pool to Pool Spacing (p-p) ft	Mean: N/A Range:	Mean: 172 Range: 73 - 340
31. Ratio of Pool-to-Pool Spacing to Bankfull (p-p/Wbkf)	Mean: N/A Range:	Mean: 4.5 Range: 1.9 - 8.9
32. Pool Length (Lp) ft	Mean: N/A Range:	Mean: 101.3 Range: 42 - 240
33. Ratio of Pool Length to Bankfull Width (Lp/Wbkf)	Mean: N/A Range:	Mean: 2.7 Range: 1.1 - 6.3
34. Riffle Slope (Sriff) ft / ft	Mean: N/A Range:	Mean: 0.00146 Range: 0.00133 - 0.00159
35. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: N/A Range:	Mean: 1.1 Range: 1.0-1.2
36. Maximum Riffle Depth (driff) ft	Mean: N/A Range:	Mean: 5.00 Range:
37. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: N/A Range:	Mean: 1.47 Range:
38. Run Slope (Srun) ft/ft	Mean: N/A Range:	Mean: 0.0074 Range: 0.0057 - 0.0092
39. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: N/A Range:	Mean: 5.6 Range: 4.3 - 6.9
40. Maximum Run Depth (drun) ft	Mean: N/A Range:	Mean: 5.45 Range: 5.07 - 5.83
41. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: N/A Range:	Mean: 1.6 Range: 1.5 - 1.7
42. Slope of Glide (Sgl) ft / ft	Mean: N/A Range:	Mean: 0.0008 Range:
43. Ratio of Glide Slope to Average Water Slope (Sgl/Sws)	Mean: N/A Range:	Mean: 0.72 Range:
44. Maximum Glide Depth (dgl) ft	Mean: N/A Range:	Mean: 5.5 Range:
45. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: N/A Range:	Mean: 1.6 Range:

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (Rhodes Mill Crk.)	Proposed Reach (Rhodes Mill Crk.)
Materials:		
Particle Size Distribution of Channel Material (mm)		
D16	<0.1	<0.1
D35	4.5	4.5
D50	8.5	8.5
D84	13.0	13.0
D95	18.2	18.2
Particle Size Distribution of Bar Material	Pavement	Sub-Pavement
D16	4.5	<2.0
D35	7.0	<2.0
D50	9.0	<2.0
D84	17.6	12.2
D95	26.0	24.3
Largest Size Particle on Bar		34.0

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (Rhodes Mill Crk.)	Proposed Reach (Rhodes Mill Crk.)
1. Stream Type	**G4 (altered C4)**	**C4**
2. Drainage Area (sq. mi)	**4.9**	**4.9**
3. Bankfull Width (Wbkf) ft	Mean: 22.3 Range: 20.5 - 24.0	Mean: 24.5 Range:
4. Bankfull Mean Depth (dbkf) ft	Mean: 2.3 Range: 2.1 - 2.5	Mean: 2.04 Range:
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 9.7 Range: 8.2	Mean: 12.0 Range:
6. Bankfull Cross-Sectional Area (Abkf) sq ft	Mean: 51.3 Range: 51.2 - 51.4	Mean: 50 Range:
7. Bankfull Mean Velocity (Vbkf) fps	Mean: 5.6 Range: 5.56 - 5.7	Mean: 5.76 Range:
8. Bankfull Discharge, (Qbkf) cfs	Mean: 287.3 Range: 285 - 292	Mean: 290 Range:
9. Maximum Bankfull Depth (dmax) ft	Mean: 3.1 Range: 2.9 - 3.3	Mean: 3.00 Range:
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 1.75 Range: 1.7 - 1.8	Mean: 1.0 Range:
11. Width of Flood Prone Area (Wfpa) ft	Mean: 300 Range:	Mean: 300 Range:
12. Entrenchment Ratio (Wfpa/Wbkf) sq ft	Mean: 13.5 Range:	Mean: 12.2 Range:
13. Meander Length (Lm) ft	Mean: N/A Range:	Mean: 198.7 Range: 166.3 - 244.7
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: N/A Range:	Mean: 8.1 Range: 6.7 - 9.9
15. Raduis of Curvature (Rc) ft	Mean: N/A Range:	Mean: 66.8 Range: 50 - 85
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: N/A Range:	Mean: 2.7 Range: 2.0 - 3.5
17. Belt Width (Wblt) ft	Mean: N/A Range:	Mean: 67.1 Range: 56.4 - 77.4
18. Meander Width Ratio (Wblt/Wbkf)	Mean: N/A Range:	Mean: 2.7 Range: 2.3 - 3.1
19. Sinuosity (Stream length/valley distance) (K)	Mean: 1.0 Range:	Mean: 1.14 Range:
20. Valley Slope (ft/ft)	Mean: 0.004 Range:	Mean: 0.0036 Range:
21. Average Water Surface Slope or Bankful for Reach (Sbkf or Savg)=(Svalley/k) ft / ft	Mean: 0.004 Range:	Mean: 0.00312 Range: 0.003 - 0.0032

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (Rhodes Mill Crk.)	Proposed Reach (Rhodes Mill Crk.)
22. Pool Slope (Spool) ft / ft	Mean: N/A Range:	Mean: 0.000312 Range: 0.0 - 0.00062
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: N/A Range:	Mean: 0.1 Range: 0.0 - 0.2
24. Maximum Pool Depth (dpool) ft	Mean: N/A Range:	Mean: 5.00 Range:
25. Ratio of Maximum Pool Depth to Bankfull Depth (dpool/dbkf)	Mean: N/A Range:	Mean: 2.45 Range:
26. Pool Width (Wpool) ft	Mean: N/A Range:	Mean: 30 Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: N/A Range:	Mean: 1.22 Range:
28. Bankfull Cross-sectional Area at Pool (Apool) sq ft	Mean: N/A Range:	Mean: 72.5 Range:
29. Ratio of Pool Area to Bankfull Area	Mean: N/A Range:	Mean: 1.45 Range:
30. Pool to Pool Spacing (p-p) ft	Mean: N/A Range:	Mean: 108.6 Range: 85 - 133
31. Ratio of Pool-to-Pool Spacing to Bankfull (p-p/Wbkf)	Mean: N/A Range:	Mean: 4.4 Range: 3.5 - 5.4
32. Pool Length (Lp) ft	Mean: N/A Range:	Mean: 70.2 Range: 50 - 100
33. Ratio of Pool Length to Bankfull Width (Lp/Wbkf)	Mean: N/A Range:	Mean: 2.9 Range: 2.04 - 4.08
34. Riffle Slope (Sriff) ft / ft	Mean: 0.004 Range:	Mean: 0.0034 Range:
35. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: 1.0 Range:	Mean: 1.1 Range:
36. Maximum Riffle Depth (driff) ft	Mean: 2.9 Range:	Mean: 3.00 Range:
37. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: 1.26 Range:	Mean: 1.47 Range:
38. Run Slope (Srun) ft/ft	Mean: 0.004 Range:	Mean: 0.01747 Range: 0.0134 - 0.0215
39. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: 1.0 Range:	Mean: 5.6 Range: 4.3 - 6.9
40. Maximum Run Depth (drun) ft	Mean: 3.3 Range:	Mean: 3.21 Range: 3.04 - 3.38
41. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: 1.4 Range:	Mean: 1.57 Range: 1.50 - 1.66
42. Slope of Glide (Sgl) ft / ft	Mean: N/A Range:	Mean: 0.0014 Range:
43. Ratio of Glide Slope to Average Water Slope (Sgl/Sws)	Mean: N/A Range:	Mean: 0.5 Range:
44. Maximum Glide Depth (dgl) ft	Mean: N/A Range:	Mean: 3.50 Range: 3.25 - 3.75
45. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: N/A Range:	Mean: 1.71 Range: 1.59 - 1.84

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (Pott Creek)	Proposed Reach (Pott Creek)
Materials:		
Particle Size Distribution of Channel Material (mm)		
D16	<0.1	<0.1
D35	0.65	0.65
D50	1.8	1.8
D84	8.5	8.5
D95	11	11
Particle Size Distribution of Bar Material	Pavement	Sub-Pavement
D16	5.0	<2.0
D35	8.2	<2.0
D50	10.0	<2.0
D84	19.5	7.3
D95	25.0	16
Largest Size Particle on Bar		27

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#1 to Pott Creek)	Proposed Reach (UT#1 to Pott Creek)
1. Stream Type	**Altered C5**	**E5**
2. Drainage Area (sq. mi)	**0.38**	**0.38**
3. Bankfull Width (Wbkf) ft	Mean: 11.5 Range:	Mean: 9.0 Range:
4. Bankfull Mean Depth (dbkf) ft	Mean: 0.61 Range:	Mean: 0.9 Range:
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 18.9 Range:	Mean: 10.0 Range:
6. Bankfull Cross-Sectional Area (Abkf) sq ft	Mean: 7.0 Range:	Mean: 8.0 Range:
7. Bankfull Mean Velocity (Vbkf) fps	Mean: 3.61 Range:	Mean: 3.67 Range:
8. Bankfull Discharge, (Qbkf) cfs	Mean: 25.0 Range:	Mean: 30 Range:
9. Maximum Bankfull Depth (dmax) ft	Mean: 1.38 Range:	Mean: 1.35 Range:
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 2.28 Range:	Mean: 1.0 Range:
11. Width of Flood Prone Area (Wfpa) ft	Mean: 20 Range:	Mean: 175 Range:
12. Entrenchment Ratio (Wfpa/Wbkf) sq ft	Mean: 1.7 Range:	Mean: 19.4 Range:
13. Meander Length (Lm) ft	Mean: N/A Range:	Mean: 82.25 Range: 69.6 - 98.7
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: N/A Range:	Mean: 9.1 Range: 7.7 - 10.9
15. Raduis of Curvature (Rc) ft	Mean: N/A Range:	Mean: 26.0 Range: 18.0 - 36.0
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: N/A Range:	Mean: 2.89 Range: 2.0 - 4.0
17. Belt Width (Wblt) ft	Mean: N/A Range:	Mean: 31.2 Range: 19.7 - 45.6
18. Meander Width Ratio (Wblt/Wbkf)	Mean: N/A Range:	Mean: 3.46 Range: 2.18 - 5.07
19. Sinuosity (Stream length/valley distance) (K)	Mean: 1.07 Range:	Mean: 1.23 Range:
20. Valley Slope (ft/ft)	Mean: 0.0091 Range:	Mean: 0.0094 Range:
21. Average Water Surface Slope or Bankful for Reach (Sbkf or Savg)=(Svalley/k) ft / ft	Mean: 0.0085 Range:	Mean: 0.00767 Range: 0.00407 - 0.00867

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#1 to Pott Creek)	Proposed Reach (UT#1 to Pott Creek)
22. Pool Slope (Spool) ft / ft	Mean: N/A Range:	Mean: 0.0007 Range: 0.0 - 0.0014
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: N/A Range:	Mean: 0.1 Range: 0.0 - 0.2
24. Maximum Pool Depth (dpool) ft	Mean: N/A Range:	Mean: 2.6 Range:
25. Ratio of Maximum Pool Depth to Bankfull Depth (dpool/dbkf)	Mean: N/A Range:	Mean: 2.89 Range:
26. Pool Width (Wpool) ft	Mean: N/A Range:	Mean: 11.0 Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: N/A Range:	Mean: 1.2 Range:
28. Bankfull Cross-sectional Area at Pool (Apool) sq ft	Mean: N/A Range:	Mean: 15.0 Range:
29. Ratio of Pool Area to Bankfull Area	Mean: N/A Range:	Mean: 1.87 Range:
30. Pool to Pool Spacing (p-p) ft	Mean: N/A Range:	Mean: 48.2 Range: 38 - 57
31. Ratio of Pool-to-Pool Spacing to Bankfull (p-p/Wbkf)	Mean: N/A Range:	Mean: 5.35 Range: 4.2 - 6.3
32. Pool Length (Lp) ft	Mean: N/A Range:	Mean: 28.8 Range: 20 - 38
33. Ratio of Pool Length to Bankfull Width (Lp/Wbkf)	Mean: N/A Range:	Mean: 3.2 Range: 2.2 - 4.2
34. Riffle Slope (Sriff) ft / ft	Mean: 0.004 Range:	Mean: 0.0084 Range:
35. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: 1.0 Range:	Mean: 1.1 Range:
36. Maximum Riffle Depth (driff) ft	Mean: 1.38 Range:	Mean: 1.35 Range:
37. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: 2.3 Range:	Mean: 1.5 Range:
38. Run Slope (Srun) ft/ft	Mean: 0.004 Range:	Mean: 0.043 Range: 0.033 - 0.053
39. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: 1.0 Range:	Mean: 5.6 Range: 4.3 - 6.9
40. Maximum Run Depth (drun) ft	Mean: 1.38 Range:	Mean: 1.65 Range: 1.39 - 1.87
41. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: 2.26 Range:	Mean: 1.83 Range: 1.54 - 2.08
42. Slope of Glide (Sgl) ft / ft	Mean: N/A Range:	Mean: 0.003 Range:
43. Ratio of Glide Slope to Average Water Slope (Sgl/Sws)	Mean: N/A Range:	Mean: 0.5 Range:
44. Maximum Glide Depth (dgl) ft	Mean: N/A Range:	Mean: 1.85 Range: 1.75 - 2.0
45. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: N/A Range:	Mean: 2.06 Range: 1.94 - 2.2

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#1 to Pott Creek)	Proposed Reach (UT#1 to Pott Creek)
Materials:		
Particle Size Distribution of Channel Material (mm)		
D16	0.2	0.2
D35	0.3	0.3
D50	0.6	0.6
D84	5.2	5.2
D95	9.0	9.0
Particle Size Distribution of Bar Material	Pavement	Sub-Pavement
D16	0.5	<2.0
D35	1.0	<2.0
D50	1.9	<2.0
D84	6.0	3.1
D95	8.0	12.6
Largest Size Particle on Bar		18

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Reference Reach
1. Stream Type	**C5**
2. Drainage Area (sq. mi)	**0.37 (236 Ac.)**
3. Bankfull Width (Wbkf) ft	Mean: 19.2 Range: 19.1 - 19.3
4. Bankfull Mean Depth (dbkf) ft	Mean: 1.1 Range: 0.8 - 1.4
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 17 Range: 13.8 - 23.8
6. Bankfull Cross-Sectional Area (Abkf) sq ft	Mean: 21.7 Range: 15.5 - 27.9
7. Bankfull Mean Velocity (Vbkf) fps	Mean: 1.8 Range:
8. Bankfull Discharge, (Qbkf) cfs	Mean: 40 Range:
9. Maximum Bankfull Depth (dmax) ft	Mean: 1.9 Range: 1.5 - 2.2
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 1.0 Range:
11. Width of Flood Prone Area (Wfpa) ft	Mean: 125 Range: 75 - 175
12. Entrenchment Ratio (Wfpa/Wbkf) sq ft	Mean: 6.5 Range: 3.91 - 9.1
13. Meander Length (Lm) ft	Mean: 90 Range: 75 - 95
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: 4.7 Range: 3.9 - 4.9
15. Raduis of Curvature (Rc) ft	Mean: 16.5 Range: 11 - 17.5
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: 0.9 Range: 0.6 - 0.9
17. Belt Width (Wblt) ft	Mean: 43 Range: 25 - 90
18. Meander Width Ratio (Wblt/Wbkf)	Mean: 2.2 Range: 1.3 - 4.7
19. Sinuosity (Stream length/valley distance) (K)	Mean: 1.5 Range:
20. Valley Slope (ft/ft)	Mean: 0.00517 Range:
21. Average Water Surface Slope or Bankful for Reach (Sbkf or Savg)=(Svalley/k) ft / ft	Mean: 0.00346 Range:

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Reference Reach	
Materials:		
Particle Size Distribution of Channel Material (mm)		
D16	<0.1	
D35	0.13	
D50	0.2	
D84	0.9	
D95	4.3	
Particle Size Distribution of Bar Material	Pavement	Sub-Pavement
D16	<0.1	0.18
D35	0.16	0.33
D50	0.21	0.56
D84	3.9	1.8
D95	10.0	7.5
Largest Size Particle on Bar	Sub-pavement	11

MORPHOLOGICAL CHARACTERISTICS OF THE EXISTING AND PROPOSED CHANNEL WITH REFERENCE REACH DATA

(Adapted from Rosgen, 1996)

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Reference Reach
22. Pool Slope (Spool) ft / ft	Mean: 0.000346 Range: 0.0000 - 0.00069
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: 0.1 Range: 0.0 - 0.2
24. Maximum Pool Depth (dpool) ft	Mean: 3.3 Range:
25. Ratio of Maximum Pool Depth to Bankfull Depth (dpool/dbkf)	Mean: 2.9 Range:
26. Pool Width (Wpool) ft	Mean: 20.3 Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: 1.1 Range:
28. Bankfull Cross-sectional Area at Pool (Apool) sq ft	Mean: 32.0 Range:
29. Ratio of Pool Area to Bankfull Area	Mean: 1.5 Range:
30. Pool to Pool Spacing (p-p) ft	Mean: 39 Range: 19 - 66
31. Ratio of Pool-to-Pool Spacing to Bankfull (p-p/Wbkf)	Mean: 2.0 Range: 1.0 - 3.4
32. Pool Length (Lp) ft	Mean: 20 Range: 15 - 26
33. Ratio of Pool Length to Bankfull Width (Lp/Wbkf)	Mean: 1.0 Range: 0.8 - 1.4
34. Riffle Slope (Sriff) ft / ft	Mean: 0.00373 Range: 0.00286 - 0.005
35. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: 1.1 Range: 0.8 - 1.4
36. Maximum Riffle Depth (driff) ft	Mean: 2.1 Range: 1.65 - 2.42
37. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: 1.9 Range: 1.5 - 2.2
38. Run Slope (Srun) ft/ft	Mean: 0.0194 Range: 0.015 - 0.0238
39. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: 5.6 Range: 4.3 - 6.9
40. Maximum Run Depth (drun) ft	Mean: 2.02 Range: 1.83 - 2.16
41. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: 1.84 Range: 1.67 - 1.96
42. Slope of Glide (Sgl) ft / ft	Mean: 0.004 Range: 0.0 - 0.008
43. Ratio of Glide Slope to Average Water Slope (Sgl/Sws)	Mean: 1.15 Range: 0.0 - 2.3
44. Maximum Glide Depth (dgl) ft	Mean: 2.42 Range: 2.1 - 3.13
45. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: 2.2 Range: 1.9 - 2.85

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#2 to Pott Creek)	Proposed Reach (UT#2 to Pott Creek)
1. Stream Type	**G5**	**E5**
2. Drainage Area (sq. mi)	**0.1 (60 Acres)**	**0.1 (60 Acres)**
3. Bankfull Width (Wbkf) ft	Mean: 4.2 Range:	Mean: 4.2 Range:
4. Bankfull Mean Depth (dbkf) ft	Mean: 0.6 Range:	Mean: 1.0 Range:
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 7.0 Range:	Mean: 4.2 Range:
6. Bankfull Cross-Sectional Area (Abkf) sq ft	Mean: 2.6 Range:	Mean: 4.2 Range:
7. Bankfull Mean Velocity (Vbkf) fps	Mean: 3.7 Range:	Mean: 3.37 Range:
8. Bankfull Discharge, (Qbkf) cfs	Mean: 9.7 Range:	Mean: 10 Range:
9. Maximum Bankfull Depth (dmax) ft	Mean: 1.3 Range:	Mean: 1.5 Range:
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 2.0 Range:	Mean: 1.0 Range:
11. Width of Flood Prone Area (Wfpa) ft	Mean: 20 Range:	Mean: 80 Range:
12. Entrenchment Ratio (Wfpa/Wbkf) sq ft	Mean: 1.7 Range:	Mean: 19 Range:
13. Meander Length (Lm) ft	Mean: N/A Range:	Mean: 46.2 Range: 31.6 - 61.1
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: N/A Range:	Mean: 11.0 Range: 7.4 - 14.5
15. Raduis of Curvature (Rc) ft	Mean: N/A Range:	Mean: 17.35 Range: 12 - 24
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: N/A Range:	Mean: 4.13 Range: 2.8 - 5.7
17. Belt Width (Wblt) ft	Mean: N/A Range:	Mean: 14.6 Range: 11.1 - 17.9
18. Meander Width Ratio (Wblt/Wbkf)	Mean: N/A Range:	Mean: 3.5 Range: 2.6 - 4.3
19. Sinuosity (Stream length/valley distance) (K)	Mean: 1.07 Range:	Mean: 1.11 Range:
20. Valley Slope (ft/ft)	Mean: 0.004 Range:	Mean: 0.0033 Range:
21. Average Water Surface Slope or Bankful for Reach (Sbkf or Savg)=(Svalley/k) ft / ft	Mean: 0.004 Range:	Mean: 0.003 Range:

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#2 to Pott Creek)	Proposed Reach (UT#2 to Pott Creek)
22. Pool Slope (Spool) ft / ft	Mean: N/A Range:	Mean: 0.0003 Range: 0.0 - 0.0006
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: N/A Range:	Mean: 0.1 Range: 0.0 - 0.2
24. Maximum Pool Depth (dpool) ft	Mean: N/A Range:	Mean: 2.5 Range:
25. Ratio of Maximum Pool Depth to Bankfull Depth (dpool/dbkf)	Mean: N/A Range:	Mean: 2.5 Range:
26. Pool Width (Wpool) ft	Mean: N/A Range:	Mean: 5.0 Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: N/A Range:	Mean: 1.2 Range:
28. Bankfull Cross-sectional Area at Pool (Apool) sq ft	Mean: N/A Range:	Mean: 6.5 Range:
29. Ratio of Pool Area to Bankfull Area	Mean: N/A Range:	Mean: 1.5 Range:
30. Pool to Pool Spacing (p-p) ft	Mean: N/A Range:	Mean: 24.6 Range: 18 - 33
31. Ratio of Pool-to-Pool Spacing to Bankfull (p-p/Wbkf)	Mean: N/A Range:	Mean: 5.8 Range: 4.3 - 7.8
32. Pool Length (Lp) ft	Mean: N/A Range:	Mean: 14.9 Range: 6 - 22
33. Ratio of Pool Length to Bankfull Width (Lp/Wbkf)	Mean: N/A Range:	Mean: 3.5 Range: 1.4 - 5.2
34. Riffle Slope (Sriff) ft / ft	Mean: 0.004 Range:	Mean: 0.0033 Range:
35. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: 1.0 Range:	Mean: 1.1 Range:
36. Maximum Riffle Depth (driff) ft	Mean: 1.38 Range:	Mean: 1.5 Range:
37. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: 2.3 Range:	Mean: 1.5 Range:
38. Run Slope (Srun) ft/ft	Mean: 0.004 Range:	Mean: 0.0168 Range:
39. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: 1.0 Range:	Mean: 5.6 Range:
40. Maximum Run Depth (drun) ft	Mean: 1.38 Range:	Mean: 1.57 Range: 1.54 - 1.6
41. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: 2.3 Range:	Mean: 1.57 Range: 1.54 - 1.6
42. Slope of Glide (Sgl) ft / ft	Mean: N/A Range:	Mean: 0.033 Range: 0.0 - 0.0066
43. Ratio of Glide Slope to Average Water Slope (Sgl/Sws)	Mean: N/A Range:	Mean: 1.1 Range: 0.0 - 2.2
44. Maximum Glide Depth (dgl) ft	Mean: N/A Range:	Mean: 2.0 Range: 1.98 - 2.04
45. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: N/A Range:	Mean: 2.0 Range: 1.98 - 2.04

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#2 to Pott Creek)	Proposed Reach (UT#2 to Pott Creek)
Materials:		
Particle Size Distribution of Channel Material (mm)		
D16	0.1	0.1
D35	0.4	0.4
D50	0.6	0.6
D84	1.5	1.5
D95	2.4	2.4
Particle Size Distribution of Bar Material	Pavement	Subpavement
D16	0.1	0.1
D35	0.4	0.4
D50	0.6	0.6
D84	1.5	1.5
D95	2.4	2.4
Largest Size Particle on Bar		5

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#3 to Pott Creek)	Proposed Reach (UT#3 to Pott Creek)
1. Stream Type	**G5**	**C5**
2. Drainage Area (sq. mi)	**0.11 (65 Acres)**	**0.11 (65 Acres)**
3. Bankfull Width (Wbkf) ft	Mean: 5.7 Range:	Mean: 8.0 Range:
4. Bankfull Mean Depth (dbkf) ft	Mean: 0.9 Range:	Mean: 0.625 Range:
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 6.3 Range:	Mean: 12.8 Range:
6. Bankfull Cross-Sectional Area (Abkf) sq ft	Mean: 4.9 Range:	Mean: 5.0 Range:
7. Bankfull Mean Velocity (Vbkf) fps	Mean: 5.1 Range:	Mean: 5.2 Range:
8. Bankfull Discharge, (Qbkf) cfs	Mean: 25 Range:	Mean: 26 Range:
9. Maximum Bankfull Depth (dmax) ft	Mean: 1.26 Range:	Mean: 1.00 Range:
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 3.2 Range:	Mean: 1.0 Range:
11. Width of Flood Prone Area (Wfpa) ft	Mean: 8.6 Range:	Mean: 250 Range:
12. Entrenchment Ratio (Wfpa/Wbkf) sq ft	Mean: 1.5 Range:	Mean: 31.3 Range:
13. Meander Length (Lm) ft	Mean: N/A Range:	Mean: 62.7 Range: 50.4 - 81.0
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: N/A Range:	Mean: 7.8 Range: 6.3 - 10.1
15. Raduis of Curvature (Rc) ft	Mean: N/A Range:	Mean: 21.1 Range: 16.0 - 26.0
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: N/A Range:	Mean: 2.6 Range: 2.0 - 3.25
17. Belt Width (Wblt) ft	Mean: 6 Range:	Mean: 23.2 Range: 16.6 - 32.0
18. Meander Width Ratio (Wblt/Wbkf)	Mean: 1.0 Range:	Mean: 2.9 Range: 2.1 - 4.0
19. Sinuosity (Stream length/valley distance) (K)	Mean: 1.00 Range:	Mean: 1.22 Range:
20. Valley Slope (ft/ft)	Mean: 0.0068 Range:	Mean: 0.0037 Range:
21. Average Water Surface Slope or Bankful for Reach (Sbkf or Savg)=(Svalley/k) ft / ft	Mean: 0.0068 Range:	Mean: 0.003 Range:

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#3 to Pott Creek)	Proposed Reach (UT#3 to Pott Creek)
22. Pool Slope (Spool) ft / ft	Mean: N/A Range:	Mean: 0.0003 Range: 0.0 - 0.0006
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: N/A Range:	Mean: 0.1 Range: 0.0 - 0.2
24. Maximum Pool Depth (dpool) ft	Mean: N/A Range:	Mean: 1.75 Range:
25. Ratio of Maximum Pool Depth to Bankfull Depth (dpool/dbkf)	Mean: N/A Range:	Mean: 2.8 Range:
26. Pool Width (Wpool) ft	Mean: N/A Range:	Mean: 9.6 Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: N/A Range:	Mean: 1.2 Range:
28. Bankfull Cross-sectional Area at Pool (Apool) sq ft	Mean: N/A Range:	Mean: 8.4 Range:
29. Ratio of Pool Area to Bankfull Area	Mean: N/A Range:	Mean: 1.68 Range:
30. Pool to Pool Spacing (p-p) ft	Mean: N/A Range:	Mean: 37.1 Range: 29 - 44
31. Ratio of Pool-to-Pool Spacing to Bankfull (p-p/Wbkf)	Mean: N/A Range:	Mean: 4.6 Range: 3.6 - 5.5
32. Pool Length (Lp) ft	Mean: N/A Range:	Mean: 23.3 Range: 18 - 34
33. Ratio of Pool Length to Bankfull Width (Lp/Wbkf)	Mean: N/A Range:	Mean: 2.9 Range: 2.25 - 4.2
34. Riffle Slope (Sriff) ft / ft	Mean: 0.0068 Range:	Mean: 0.0033 Range:
35. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: 1.0 Range:	Mean: 1.1 Range:
36. Maximum Riffle Depth (driff) ft	Mean: 1.26 Range:	Mean: 1.0 Range:
37. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: 1.4 Range:	Mean: 1.6 Range:
38. Run Slope (Srun) ft/ft	Mean: 0.0068 Range:	Mean: 0.0168 Range:
39. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: 1.0 Range:	Mean: 5.6 Range:
40. Maximum Run Depth (drun) ft	Mean: 1.26 Range:	Mean: 1.07 Range: 1.05 - 1.1
41. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: 1.4 Range:	Mean: 1.7 Range: 1.68 - 1.76
42. Slope of Glide (Sgl) ft / ft	Mean: N/A Range:	Mean: 0.0033 Range: 0.0 - 0.0066
43. Ratio of Glide Slope to Average Water Slope (Sgl/Sws)	Mean: N/A Range:	Mean: 1.1 Range: 0.0 - 2.2
44. Maximum Glide Depth (dgl) ft	Mean: N/A Range:	Mean: 1.4 Range:
45. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: N/A Range:	Mean: 2.24 Range:

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#3 to Pott Creek)	Proposed Reach (UT#3 to Pott Creek)
Materials:		
Particle Size Distribution of Channel Material (mm)		
D16	0.05	0.05
D35	0.07	0.07
D50	0.10	0.10
D84	0.20	0.20
D95	0.23	0.23
Particle Size Distribution of Bar Material	Pavement	Subpavement
D16	0.05	0.05
D35	0.07	0.07
D50	0.10	0.10
D84	0.20	0.20
D95	0.23	0.23
Largest Size Particle on Bar		0.5

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#4 to Pott Creek)	Proposed Reach (UT#4 to Pott Creek)
1. Stream Type	**Altered E5**	**E5**
2. Drainage Area (sq. mi)	**0.11 (65 Acres)**	**0.11 (65 Acres)**
3. Bankfull Width (Wbkf) ft	Mean: 4.2 Range:	Mean: 4.6 Range:
4. Bankfull Mean Depth (dbkf) ft	Mean: 0.4 Range:	Mean: 0.52 Range:
5. Width/Depth Ratio (Wbkf/dbkf)	Mean: 11.0 Range:	Mean: 8.8 Range:
6. Bankfull Cross-Sectional Area (Abkf) sq ft	Mean: 1.6 Range:	Mean: 2.4 Range:
7. Bankfull Mean Velocity (Vbkf) fps	Mean: 4.1 Range:	Mean: 2.9 Range:
8. Bankfull Discharge, (Qbkf) cfs	Mean: 6.6 Range:	Mean: 6.9 Range:
9. Maximum Bankfull Depth (dmax) ft	Mean: 0.7 Range:	Mean: 0.8 Range:
10. Ratio of Low Bank Height to Max. Bankfull Depth (Bhlow/dmax)	Mean: 1.0 Range:	Mean: 1.0 Range:
11. Width of Flood Prone Area (Wfpa) ft	Mean: 115 Range:	Mean: 115 Range:
12. Entrenchment Ratio (Wfpa/Wbkf) sq ft	Mean: 27.4 Range:	Mean: 20.5 Range:
13. Meander Length (Lm) ft	Mean: N/A Range:	Mean: 28.7 Range: 18.1 - 38.5
14. Ratio of Meander Length to Bankfull Width (Lm/Wbkf)	Mean: N/A Range:	Mean: 6.2 Range: 3.9 - 8.4
15. Raduis of Curvature (Rc) ft	Mean: N/A Range:	Mean: 9 Range: 7 - 13
16. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	Mean: N/A Range:	Mean: 1.96 Range: 1.5 - 2.8
17. Belt Width (Wblt) ft	Mean: N/A Range:	Mean: 12.5 Range: 7.2 - 16.1
18. Meander Width Ratio (Wblt/Wbkf)	Mean: N/A Range:	Mean: 2.7 Range: 1.56 - 3.5
19. Sinuosity (Stream length/valley distance) (K)	Mean: 1.0 Range:	Mean: 1.24 Range:
20. Valley Slope (ft/ft)	Mean: 0.004 Range:	Mean: 0.0037 Range:
21. Average Water Surface Slope or Bankful for Reach (Sbkf or Savg)=(Svalley/k) ft / ft	Mean: 0.004 Range:	Mean: 0.003 Range:

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#4 to Pott Creek)	Proposed Reach (UT#4 to Pott Creek)
22. Pool Slope (Spool) ft / ft	Mean: N/A Range:	Mean: 0.0003 Range: 0.0 - 0.0006
23. Ratio of Pool Slope to Average Slope (Spool/Sbkf)	Mean: N/A Range:	Mean: 0.1 Range: 0.0 - 0.2
24. Maximum Pool Depth (dpool) ft	Mean: N/A Range:	Mean: 1.6 Range:
25. Ratio of Maximum Pool Depth to Bankfull Depth (dpool/dbkf)	Mean: N/A Range:	Mean: 3.2 Range:
26. Pool Width (Wpool) ft	Mean: N/A Range:	Mean: 5.5 Range:
27. Ratio of Pool Width to Bankfull Width (Wpool/Wbkf)	Mean: N/A Range:	Mean: 1.2 Range:
28. Bankfull Cross-sectional Area at Pool (Apool) sq ft	Mean: N/A Range:	Mean: 4.0 Range:
29. Ratio of Pool Area to Bankfull Area	Mean: N/A Range:	Mean: 1.67 Range:
30. Pool to Pool Spacing (p-p) ft	Mean: N/A Range:	Mean: 17 Range: 9 - 22
31. Ratio of Pool-to-Pool Spacing to Bankfull (p-p/Wbkf)	Mean: N/A Range:	Mean: 3.7 Range: 1.96 - 4.78
32. Pool Length (Lp) ft	Mean: N/A Range:	Mean: 8.8 Range: 4 - 13
33. Ratio of Pool Length to Bankfull Width (Lp/Wbkf)	Mean: N/A Range:	Mean: 1.91 Range: 0.87 - 2.83
34. Riffle Slope (Sriff) ft / ft	Mean: 0.004 Range:	Mean: 0.004 Range:
35. Ratio of Riffle Slope to Average Slope (Sriff/Sbkf)	Mean: 1.0 Range:	Mean: 1.3 Range:
36. Maximum Riffle Depth (driff) ft	Mean: 0.7 Range:	Mean: 0.80 Range:
37. Ratio of Riffle Depth to Bankfull Mean Depth (driff/dbkf)	Mean: 1.75 Range:	Mean: 1.54 Range:
38. Run Slope (Srun) ft/ft	Mean: 0.004 Range:	Mean: 0.0168 Range:
39. Ratio of Run Slope to Average Slope (Srun/Sbkf)	Mean: 1.0 Range:	Mean: 5.6 Range:
40. Maximum Run Depth (drun) ft	Mean: 0.8 Range:	Mean: 0.85 Range:
41. Ratio of Run Depth to Bankfull Mean Depth (drun/dbkf)	Mean: 2.0 Range:	Mean: 1.63 Range:
42. Slope of Glide (Sgl) ft / ft	Mean: N/A Range:	Mean: 0.0003 Range: 0.0 - 0.0006
43. Ratio of Glide Slope to Average Water Slope (Sgl/Sws)	Mean: N/A Range:	Mean: 0.1 Range: 0.0 - 0.2
44. Maximum Glide Depth (dgl) ft	Mean: N/A Range:	Mean: 1.3 Range:
45. Ratio of Glide Depth to Bankfull Mean Depth (dgl/dbkf)	Mean: N/A Range:	Mean: 2.5 Range:

Restoration Site: Pott Creek II, Catawba County
USGS Gage Station: None
Reference Reach: UT to Fourth Creek
Surveyors: GLS, JSF, TBB, HMB

Variables	Existing Channel (UT#4 to Pott Creek)	Proposed Reach (UT#4 to Pott Creek)
Materials:		
Particle Size Distribution of Channel Material (mm)		
D16	0.05	0.05
D35	0.07	0.07
D50	0.10	0.10
D84	0.15	0.15
D95	0.20	0.20
Particle Size Distribution of Bar Material	Pavement	Subpavement
D16	0.05	0.05
D35	0.07	0.07
D50	0.10	0.10
D84	0.15	0.15
D95	0.20	0.20
Largest Size Particle on Bar		0.5

Sediment Transport Validation

Project:	Pott Creek II Mitigation Site	
Stream:	Pott Creek (Proposed)	
Date:	9/15/2004	
Reach:	Jarrett Property	
		Units
Q_{Bkf}	600	cfs
W/D_{Design}	11.2	
Side Slopes:	2:1	
Mannings n:	0.04	
Svalley=	0.0015	ft./ft.
Sinuosity =	1.14	
$S_{WS} = S_{Valley}/Sin.$ =	0.00133	ft./ft.
V =	4.61	fps
$A_{Bkf} = Q/V$ =	130	sq.ft.
$W_{Bkf = (A*W/D)}^{0.5}$	38	ft.
$D_{Mean} = A/W$ =	3.4	ft.
D_{Max} =	5.0	ft.
P =	44.8	ft.
R = A/P =	2.9	ft.
$\tau_c = \gamma S_{WS} R$ =	0.22	lb/ft^2
Particle Moved =	12	mm

Sediment Transport Validation

Project:	Pott Creek II Mitigation Site
Stream:	Rhodes Mill Creek (Proposed)
Date:	9/15/2004
Reach:	Hoyle Property

		Units
Q_{Bkf}	290	cfs
W/D_{Design}	12	
Side Slopes:	2:1	
Mannings n:	0.04	
Svalley=	0.0036	ft./ft.
Sinuosity =	1.14	

$S_{WS} = S_{Valley}/Sin. =$	0.00312	ft./ft.
V =	5.76	fps
$A_{Bkf} = Q/V =$	50	sq.ft.
$W_{Bkf = (A*W/D)^{0.5}}$	24.5	ft.
$D_{Mean} = A/W =$	2.04	ft.
$D_{Max} =$	3.05	ft.
P =	28.58	ft.
R = A/P =	1.75	ft.

$\tau_c = \gamma S_{WS} R =$	0.42	lb/ft^2
Particle Moved =	25	mm

Sediment Transport Validation

Project:	Pott Creek II Mitigation Site
Stream:	UT #1 to Pott Creek (Proposed)
Date:	9/15/2004
Reach:	Jarrett Property

		Units
Q_{Bkf}	30	cfs
W/D_{Design}	10	
Side Slopes:	1.5:1	
Mannings n:	0.04	
Svalley=	0.0094	ft./ft.
Sinuosity =	1.23	

$S_{WS} = S_{Valley}/Sin.$ =	0.0076	ft./ft.
V =	3.67	fps
$A_{Bkf} = Q/V$ =	8.2	sq.ft.
$W_{Bkf = (A*W/D)}^{0.5}$	9	ft.
$D_{Mean} = A/W$ =	0.9	ft.
D_{Max} =	1.35	ft.
P =	10.8	ft.
R = A/P =	0.76	ft.

$\tau_c = \gamma S_{WS} R$ =	0.3	lb/ft^2
Particle Moved =	18	mm

Sediment Transport Validation

Project:	Pott Creek II Mitigation Site
Stream:	UT #2 to Pott Creek (Proposed)
Date:	9/15/2004
Reach:	Jarrett Property

		Units
Q_{Bkf}	10	cfs
W/D_{Design}	12	
Side Slopes:	1.5:1	
Mannings n:	0.025	
Svalley=	0.0033	ft./ft.
Sinuosity =	1.11	

$S_{WS} = S_{Valley}/Sin. =$	0.003	ft./ft.
V =	3.37	fps
$A_{Bkf} = Q/V =$	3	sq.ft.
$W_{Bkf = (A*W/D)}^{0.5}$	6	ft.
$D_{Mean} = A/W =$	0.5	ft.
$D_{Max} =$	0.65	ft.
P =	7	ft.
R = A/P =	0.43	ft.

$\tau_c = \gamma S_{WS} R =$	0.1	lb/ft^2
Particle Moved =	6.8	mm

Sediment Transport Validation

Project:	Pott Creek II Mitigation Site
Stream:	UT #3 to Pott Creek (Proposed)
Date:	9/15/2004
Reach:	Jarrett Property

		Units
Q_{Bkf}	26	cfs
W/D_{Design}	12.8	
Side Slopes:	1.5:1	
Mannings n:	0.04	
Svalley=	0.0037	ft./ft.
Sinuosity =	1.22	

$S_{WS} = S_{Valley}/Sin. =$	0.003	ft./ft.
V =	5.2	fps
$A_{Bkf} = Q/V =$	5	sq.ft.
$W_{Bkf = (A*W/D)}^{0.5}$	8	ft.
$D_{Mean} = A/W =$	0.63	ft.
$D_{Max} =$	1	ft.
P =	9.25	ft.
R = A/P =	0.54	ft.

$\tau_c = \gamma S_{WS} R =$	0.11	lb/ft^2
Particle Moved =	7	mm

Sediment Transport Validation

Project:	Pott Creek II Mitigation Site
Stream:	UT #4 to Pott Creek (Proposed)
Date:	4/12/2004
Reach:	Jarrett Property

		Units
Q_{Bkf}	6.9	cfs
W/D_{Design}	8.8	
Side Slopes:	1.5:1	
Mannings n:	0.04	
Svalley=	0.0037	ft./ft.
Sinuosity =	1.24	

$S_{WS} = S_{Valley}/Sin. =$	0.003	ft./ft.
V =	3	fps
$A_{Bkf} = Q/V =$	2.4	sq.ft.
$W_{Bkf = (A*W/D)}^{0.5}$	4.6	ft.
$D_{Mean} = A/W =$	0.52	ft.
$D_{Max} =$	0.8	ft.
P =	5.64	ft.
R = A/P =	0.43	ft.

$\tau_c = \gamma S_{WS} R =$	0.08	lb/ft^2
Particle Moved =	5	mm

HEC-RAS Plan: Existing River: Pott Creek Reach: Jarrett Property

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)	
Jarrett Property	318	2-yr	900.00	799.40	806.95	803.38	807.25	0.002216	4.48	261.58	221.27	0.33
Jarrett Property	318	5-yr	1500.00	799.40	807.79	804.79	808.01	0.001945	4.51	997.78	543.55	0.31
Jarrett Property	318	10-yr	2000.00	799.40	808.40	805.77	808.61	0.001893	4.73	1335.36	553.83	0.31
Jarrett Property	318	25-yr	2700.00	799.40	809.00	807.71	809.22	0.002065	5.21	1666.76	563.74	0.33
Jarrett Property	318	50-yr	3400.00	799.40	809.51	807.94	809.76	0.002193	5.61	1960.60	572.39	0.35
Jarrett Property	318	100-yr	4000.00	799.40	809.95	808.20	810.20	0.002225	5.85	2212.90	579.71	0.35
Jarrett Property	317	2-yr	900.00	797.80	806.07	801.51	806.17	0.000837	2.97	857.66	658.81	0.20
Jarrett Property	317	5-yr	1500.00	797.80	806.36	802.81	806.57	0.001678	4.32	1053.98	673.36	0.28
Jarrett Property	317	10-yr	2000.00	797.80	806.34	803.75	806.71	0.003063	5.82	1037.85	672.18	0.38
Jarrett Property	317	25-yr	2700.00	797.80	807.04	804.93	807.35	0.002697	5.81	1522.46	706.88	0.37
Jarrett Property	317	50-yr	3400.00	797.80	807.73	806.53	807.98	0.002282	5.66	2021.15	740.90	0.34
Jarrett Property	317	100-yr	4000.00	797.80	808.33	806.76	808.54	0.001950	5.47	2473.20	770.44	0.32
Jarrett Property	316	2-yr	900.00	796.90	804.93	801.60	805.39	0.003402	5.43	165.61	27.02	0.39
Jarrett Property	316	5-yr	1500.00	796.90	805.37	803.16	805.57	0.002417	4.73	1043.32	470.33	0.33
Jarrett Property	316	10-yr	2000.00	796.90	805.75	804.25	805.80	0.001021	3.19	2125.28	833.05	0.21
Jarrett Property	316	25-yr	2700.00	796.90	806.53	805.12	806.58	0.000855	3.13	2780.78	842.94	0.20
Jarrett Property	316	50-yr	3400.00	796.90	807.29	805.45	807.33	0.000726	3.08	3422.58	852.51	0.19
Jarrett Property	316	100-yr	4000.00	796.90	807.94	805.12	807.98	0.000633	3.02	3980.50	860.74	0.18
Jarrett Property	315	2-yr	900.00	795.20	803.42	799.93	803.52	0.001165	3.21	874.41	401.75	0.22
Jarrett Property	315	5-yr	1500.00	795.20	804.22	801.53	804.27	0.000827	2.91	1669.25	592.86	0.19
Jarrett Property	315	10-yr	2000.00	795.20	804.88	802.67	804.94	0.000808	3.06	2064.65	602.07	0.19
Jarrett Property	315	25-yr	2700.00	795.20	805.76	803.35	805.81	0.000753	3.17	2595.31	611.02	0.19
Jarrett Property	315	50-yr	3400.00	795.20	806.60	803.60	806.65	0.000690	3.22	3113.46	619.16	0.18
Jarrett Property	315	100-yr	4000.00	795.20	807.32	803.61	807.37	0.000634	3.24	3561.93	626.11	0.18
Jarrett Property	314	2-yr	900.00	796.00	802.77	800.21	802.81	0.000664	2.38	1262.37	608.18	0.18
Jarrett Property	314	5-yr	1500.00	796.00	803.58	801.64	803.63	0.000774	2.84	1780.58	655.93	0.20
Jarrett Property	314	10-yr	2000.00	796.00	804.26	802.00	804.31	0.000741	2.98	2235.07	675.92	0.20
Jarrett Property	314	25-yr	2700.00	796.00	805.19	802.47	805.24	0.000670	3.09	2873.90	703.09	0.20
Jarrett Property	314	50-yr	3400.00	796.00	806.08	802.61	806.13	0.000601	3.15	3515.79	729.51	0.19
Jarrett Property	314	100-yr	4000.00	796.00	806.85	802.67	806.90	0.000543	3.18	4083.79	752.11	0.18
Jarrett Property	313	2-yr	900.00	795.20	802.27	799.80	802.36	0.001206	3.25	826.81	371.82	0.24
Jarrett Property	313	5-yr	1500.00	795.20	802.90	801.70	803.04	0.001830	4.29	1072.06	406.98	0.30
Jarrett Property	313	10-yr	2000.00	795.20	803.60	801.71	803.75	0.001786	4.55	1369.96	441.92	0.30
Jarrett Property	313	25-yr	2700.00	795.20	804.60	802.10	804.73	0.001564	4.66	1834.55	491.84	0.29
Jarrett Property	313	50-yr	3400.00	795.20	805.56	802.48	805.69	0.001335	4.65	2333.45	537.86	0.27
Jarrett Property	313	100-yr	4000.00	795.20	806.39	802.77	806.50	0.001155	4.59	2792.70	575.06	0.26
Jarrett Property	312	2-yr	900.00	794.70	799.83	799.24	801.03	0.014952	8.80	102.24	28.32	0.82
Jarrett Property	312	5-yr	1500.00	794.70	801.57	800.57	801.91	0.004243	5.98	683.87	290.63	0.46
Jarrett Property	312	10-yr	2000.00	794.70	802.55	801.02	802.80	0.002900	5.54	1032.65	350.97	0.39
Jarrett Property	312	25-yr	2700.00	794.70	803.76	801.54	803.97	0.002111	5.33	1487.40	396.30	0.35
Jarrett Property	312	50-yr	3400.00	794.70	804.88	802.00	805.06	0.001677	5.22	1951.60	438.85	0.31
Jarrett Property	312	100-yr	4000.00	794.70	805.80	802.26	805.97	0.001412	5.12	2372.96	474.98	0.29
Jarrett Property	311	2-yr	900.00	792.90	799.93	796.78	799.95	0.000289	1.58	935.19	498.07	0.12
Jarrett Property	311	5-yr	1500.00	792.90	801.26	798.06	801.28	0.000251	1.71	1422.27	521.62	0.12
Jarrett Property	311	10-yr	2000.00	792.90	802.25	798.96	802.28	0.000227	1.79	1795.51	536.71	0.12
Jarrett Property	311	25-yr	2700.00	792.90	803.49	799.61	803.53	0.000207	1.89	2274.21	555.62	0.11
Jarrett Property	311	50-yr	3400.00	792.90	804.63	799.61	804.66	0.000193	1.99	2720.57	572.86	0.11
Jarrett Property	311	100-yr	4000.00	792.90	805.57	799.61	805.60	0.000182	2.05	3098.04	587.99	0.11
Jarrett Property	310	2-yr	900.00	792.50	799.80	796.23	799.83	0.000415	1.99	1048.09	452.90	0.15
Jarrett Property	310	5-yr	1500.00	792.50	801.15	797.46	801.18	0.000312	2.00	1700.46	498.08	0.14
Jarrett Property	310	10-yr	2000.00	792.50	802.16	798.30	802.19	0.000260	2.00	2216.35	523.53	0.13
Jarrett Property	310	25-yr	2700.00	792.50	803.42	799.04	803.45	0.000218	2.03	2895.40	555.26	0.12
Jarrett Property	310	50-yr	3400.00	792.50	804.57	799.33	804.59	0.000191	2.06	3546.70	584.07	0.11
Jarrett Property	310	100-yr	4000.00	792.50	805.51	799.50	805.54	0.000170	2.06	4109.32	600.75	0.11
Jarrett Property	309	2-yr	900.00	792.40	799.34	796.81	799.75	0.003023	5.23	206.44	272.35	0.39
Jarrett Property	309	5-yr	1500.00	792.40	800.49	798.28	801.09	0.003748	6.61	307.69	385.59	0.45
Jarrett Property	309	10-yr	2000.00	792.40	801.43	799.56	802.10	0.003702	7.18	405.46	427.93	0.46
Jarrett Property	309	25-yr	2700.00	792.40	802.62	800.49	803.35	0.003527	7.72	530.50	561.85	0.46
Jarrett Property	309	50-yr	3400.00	792.40	803.70	801.28	804.49	0.003365	8.16	644.31	574.42	0.46
Jarrett Property	309	100-yr	4000.00	792.40	805.50	801.80	805.53	0.000218	2.32	3964.78	673.42	0.12
Jarrett Property	308.5		Bridge									
Jarrett Property	308	2-yr	900.00	792.00	799.07	795.59	799.30	0.001693	3.89	252.65	186.81	0.30
Jarrett Property	308	5-yr	1500.00	792.00	799.86	796.82	800.29	0.002749	5.43	316.52	198.18	0.39
Jarrett Property	308	10-yr	2000.00	792.00	800.48	797.68	801.06	0.003340	6.37	368.11	205.39	0.43
Jarrett Property	308	25-yr	2700.00	792.00	801.26	799.17	802.03	0.003919	7.43	435.94	214.94	0.48
Jarrett Property	308	50-yr	3400.00	792.00	801.82	799.93	802.81	0.004663	8.49	484.84	229.97	0.53
Jarrett Property	308	100-yr	4000.00	792.00	802.40	800.50	803.52	0.004905	9.12	535.11	576.45	0.54
Jarrett Property	307	2-yr	900.00	792.10	799.00	795.26	799.21	0.001443	3.69	245.23	53.57	0.27
Jarrett Property	307	5-yr	1500.00	792.10	799.89	796.42	800.07	0.001378	3.96	931.83	538.51	0.27

HEC-RAS Plan: Existing River: Pott Creek Reach: Jarrett Property (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)	
Jarrett Property	307	10-yr	2000.00	792.10	800.59	797.23	800.75	0.001215	3.98	1318.93	558.43	0.26
Jarrett Property	307	25-yr	2700.00	792.10	801.49	798.25	801.62	0.001021	3.94	1826.82	576.81	0.24
Jarrett Property	307	50-yr	3400.00	792.10	802.15	799.88	802.28	0.000985	4.08	2216.01	590.50	0.24
Jarrett Property	307	100-yr	4000.00	792.10	802.80	800.18	802.93	0.000885	4.06	2605.48	603.90	0.23
Jarrett Property	306	2-yr	900.00	791.90	798.88	795.75	798.94	0.000766	2.57	816.03	573.55	0.20
Jarrett Property	306	5-yr	1500.00	791.90	799.75	797.03	799.81	0.000753	2.83	1370.09	715.96	0.20
Jarrett Property	306	10-yr	2000.00	791.90	800.48	797.94	800.53	0.000598	2.72	1931.43	794.72	0.18
Jarrett Property	306	25-yr	2700.00	791.90	801.40	798.67	801.44	0.000447	2.56	2682.75	830.52	0.16
Jarrett Property	306	50-yr	3400.00	791.90	802.07	799.03	802.11	0.000410	2.60	3250.28	852.04	0.16
Jarrett Property	306	100-yr	4000.00	791.90	802.74	799.24	802.78	0.000354	2.54	3822.31	869.52	0.15
Jarrett Property	305	2-yr	900.00	789.70	798.47	795.80	798.70	0.002193	4.11	328.23	165.40	0.34
Jarrett Property	305	5-yr	1500.00	789.70	799.53	797.13	799.63	0.001159	3.43	1260.67	475.54	0.25
Jarrett Property	305	10-yr	2000.00	789.70	800.27	797.76	800.37	0.001090	3.60	1618.15	491.10	0.25
Jarrett Property	305	25-yr	2700.00	789.70	801.21	798.80	801.31	0.001006	3.79	2087.01	508.54	0.25
Jarrett Property	305	50-yr	3400.00	789.70	801.87	798.90	801.99	0.001052	4.11	2429.07	520.89	0.26
Jarrett Property	305	100-yr	4000.00	789.70	802.55	799.14	802.66	0.000998	4.22	2783.56	533.39	0.25
Jarrett Property	304	2-yr	900.00	788.60	798.43	795.78	798.44	0.000226	1.30	1862.19	779.42	0.10
Jarrett Property	304	5-yr	1500.00	788.60	799.44	797.19	799.45	0.000214	1.44	2660.16	798.04	0.11
Jarrett Property	304	10-yr	2000.00	788.60	800.19	797.70	800.20	0.000205	1.53	3260.95	811.88	0.10
Jarrett Property	304	25-yr	2700.00	788.60	801.14	797.70	801.15	0.000194	1.62	4038.04	829.87	0.10
Jarrett Property	304	50-yr	3400.00	788.60	801.80	797.71	801.81	0.000207	1.78	4592.34	842.47	0.11
Jarrett Property	304	100-yr	4000.00	788.60	802.48	797.71	802.49	0.000199	1.84	5168.56	855.36	0.11
Jarrett Property	303	2-yr	900.00	790.80	798.32	794.86	798.35	0.000438	1.92	1295.35	841.67	0.15
Jarrett Property	303	5-yr	1500.00	790.80	799.36	796.44	799.38	0.000296	1.78	2250.82	970.79	0.12
Jarrett Property	303	10-yr	2000.00	790.80	800.12	797.32	800.13	0.000221	1.66	3000.14	998.16	0.11
Jarrett Property	303	25-yr	2700.00	790.80	801.08	797.74	801.09	0.000170	1.59	3975.11	1035.83	0.10
Jarrett Property	303	50-yr	3400.00	790.80	801.74	798.07	801.75	0.000165	1.64	4670.19	1061.55	0.10
Jarrett Property	303	100-yr	4000.00	790.80	802.42	798.25	802.44	0.000145	1.62	5403.87	1083.06	0.09
Jarrett Property	302	2-yr	900.00	790.64	798.22	794.79	798.26	0.000554	2.12	907.47	462.69	0.17
Jarrett Property	302	5-yr	1500.00	790.64	799.26	795.97	799.31	0.000506	2.31	1417.62	515.30	0.17
Jarrett Property	302	10-yr	2000.00	790.64	800.03	797.06	800.08	0.000464	2.40	1828.82	553.62	0.17
Jarrett Property	302	25-yr	2700.00	790.64	800.99	797.72	801.04	0.000421	2.51	2378.95	586.15	0.16
Jarrett Property	302	50-yr	3400.00	790.64	801.65	798.00	801.70	0.000443	2.72	2771.02	608.27	0.17
Jarrett Property	302	100-yr	4000.00	790.64	802.34	798.22	802.39	0.000415	2.78	3197.17	631.44	0.16
Jarrett Property	301	2-yr	900.00	790.60	798.13	794.22	798.24	0.000839	2.91	636.27	269.27	0.21
Jarrett Property	301	5-yr	1500.00	790.60	799.11	795.40	799.28	0.001188	3.77	926.03	322.82	0.26
Jarrett Property	301	10-yr	2000.00	790.60	799.92	796.24	800.05	0.000961	3.63	1472.91	557.26	0.24
Jarrett Property	301	25-yr	2700.00	790.60	800.92	797.49	801.02	0.000788	3.58	2048.00	592.97	0.22
Jarrett Property	301	50-yr	3400.00	790.60	801.58	798.10	801.69	0.000782	3.75	2445.96	610.13	0.22
Jarrett Property	301	100-yr	4000.00	790.60	802.28	798.57	802.38	0.000696	3.72	2878.49	628.24	0.21

HEC-RAS Plan: Proposed River: Pott Creek Reach: Jarrett Property

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)	
Jarrett Property	318	2-yr	900.00	799.40	806.60	803.38	806.97	0.002743	4.86	185.20	33.62	0.36
Jarrett Property	318	5-yr	1500.00	799.40	807.74	804.79	807.90	0.001596	4.07	973.32	542.79	0.28
Jarrett Property	318	10-yr	2000.00	799.40	808.14	805.79	808.32	0.001835	4.54	1187.12	549.34	0.31
Jarrett Property	318	25-yr	2700.00	799.40	808.67	807.70	808.86	0.001950	4.92	1485.95	558.35	0.32
Jarrett Property	318	50-yr	3400.00	799.40	809.11	807.76	809.31	0.002097	5.30	1730.42	565.62	0.34
Jarrett Property	318	100-yr	4000.00	799.40	809.45	807.98	809.67	0.002187	5.58	1926.40	571.39	0.35
Jarrett Property	317	2-yr	900.00	797.80	804.86	801.44	805.12	0.001938	4.11	241.82	105.15	0.31
Jarrett Property	317	5-yr	1500.00	797.80	805.89	802.69	806.28	0.002625	5.26	441.39	228.98	0.37
Jarrett Property	317	10-yr	2000.00	797.80	805.93	803.56	806.36	0.003337	5.96	815.03	651.91	0.42
Jarrett Property	317	25-yr	2700.00	797.80	806.47	805.64	806.86	0.003251	6.21	1173.63	678.53	0.42
Jarrett Property	317	50-yr	3400.00	797.80	807.03	806.27	807.36	0.002837	6.12	1566.39	706.54	0.40
Jarrett Property	317	100-yr	4000.00	797.80	807.54	806.50	807.81	0.002445	5.93	1926.82	731.30	0.37
Jarrett Property	316	2-yr	900.00	796.90	803.72	802.05	803.96	0.002850	4.50	410.24	268.76	0.37
Jarrett Property	316	5-yr	1500.00	796.90	804.57	803.00	804.83	0.003110	5.12	709.38	380.95	0.39
Jarrett Property	316	10-yr	2000.00	796.90	805.17	803.91	805.25	0.001347	3.58	1719.95	825.81	0.26
Jarrett Property	316	25-yr	2700.00	796.90	805.76	804.60	805.83	0.001231	3.64	2204.32	833.19	0.25
Jarrett Property	316	50-yr	3400.00	796.90	806.45	804.90	806.51	0.000994	3.50	2780.64	841.89	0.23
Jarrett Property	316	100-yr	4000.00	796.90	807.03	805.10	807.08	0.000846	3.40	3272.73	849.24	0.21
Jarrett Property	315	2-yr	900.00	796.00	802.47		802.54	0.000861	2.69	917.84	561.19	0.22
Jarrett Property	315	5-yr	1500.00	796.00	803.45		803.50	0.000728	2.79	1476.49	582.11	0.20
Jarrett Property	315	10-yr	2000.00	796.00	804.11		804.17	0.000678	2.90	1866.73	591.37	0.20
Jarrett Property	315	25-yr	2700.00	796.00	804.96		805.01	0.000623	3.02	2372.42	603.15	0.20
Jarrett Property	315	50-yr	3400.00	796.00	805.74		805.80	0.000576	3.10	2847.49	610.88	0.19
Jarrett Property	315	100-yr	4000.00	796.00	806.39		806.45	0.000539	3.16	3246.69	617.16	0.19
Jarrett Property	314	2-yr	900.00	795.00	801.74		801.81	0.000826	2.73	864.79	494.84	0.21
Jarrett Property	314	5-yr	1500.00	795.00	802.82		802.88	0.000738	2.93	1451.03	614.45	0.21
Jarrett Property	314	10-yr	2000.00	795.00	803.55		803.61	0.000651	2.97	1921.43	655.08	0.20
Jarrett Property	314	25-yr	2700.00	795.00	804.47		804.52	0.000561	2.99	2535.20	681.97	0.19
Jarrett Property	314	50-yr	3400.00	795.00	805.30		805.35	0.000503	3.03	3111.52	706.34	0.18
Jarrett Property	314	100-yr	4000.00	795.00	805.98		806.03	0.000461	3.05	3602.94	726.57	0.18
Jarrett Property	313	2-yr	900.00	794.40	801.11	798.47	801.25	0.001349	3.47	544.95	310.11	0.27
Jarrett Property	313	5-yr	1500.00	794.40	802.23	799.77	802.37	0.001258	3.83	925.58	369.66	0.27
Jarrett Property	313	10-yr	2000.00	794.40	803.01	800.82	803.15	0.001187	4.03	1228.33	412.81	0.27
Jarrett Property	313	25-yr	2700.00	794.40	803.98	801.32	804.11	0.001075	4.18	1652.92	460.30	0.26
Jarrett Property	313	50-yr	3400.00	794.40	804.85	801.74	804.98	0.000989	4.30	2072.03	504.57	0.26
Jarrett Property	313	100-yr	4000.00	794.40	805.57	802.02	805.69	0.000908	4.34	2447.57	537.94	0.25
Jarrett Property	312	2-yr	900.00	793.90	800.40	798.00	800.57	0.001659	3.75	464.42	245.91	0.30
Jarrett Property	312	5-yr	1500.00	793.90	801.56	799.61	801.74	0.001568	4.20	775.68	290.42	0.30
Jarrett Property	312	10-yr	2000.00	793.90	802.39	800.14	802.57	0.001414	4.35	1072.97	345.28	0.29
Jarrett Property	312	25-yr	2700.00	793.90	803.43	800.72	803.60	0.001248	4.49	1452.06	384.01	0.28
Jarrett Property	312	50-yr	3400.00	793.90	804.35	801.15	804.51	0.001137	4.61	1818.86	418.17	0.27
Jarrett Property	312	100-yr	4000.00	793.90	805.11	801.51	805.27	0.001044	4.66	2147.52	447.91	0.27
Jarrett Property	311	2-yr	900.00	792.90	799.77	797.32	799.81	0.000493	2.18	919.77	484.71	0.17
Jarrett Property	311	5-yr	1500.00	792.90	800.94	797.90	800.99	0.000511	2.54	1344.89	516.75	0.18
Jarrett Property	311	10-yr	2000.00	792.90	801.50	798.30	801.86	0.000498	2.72	1668.41	529.93	0.18
Jarrett Property	311	25-yr	2700.00	792.90	802.88	798.71	802.94	0.000483	2.94	2078.05	546.29	0.18
Jarrett Property	311	50-yr	3400.00	792.90	803.82	799.04	803.88	0.000478	3.14	2441.06	560.50	0.18
Jarrett Property	311	100-yr	4000.00	792.90	804.60	799.33	804.67	0.000466	3.27	2750.17	572.40	0.18
Jarrett Property	310	2-yr	900.00	792.50	799.56	796.59	799.61	0.000567	2.35	956.27	434.37	0.18
Jarrett Property	310	5-yr	1500.00	792.50	800.75	798.50	800.79	0.000514	2.56	1511.65	487.78	0.18
Jarrett Property	310	10-yr	2000.00	792.50	801.63	798.65	801.68	0.000462	2.64	1953.14	510.08	0.17
Jarrett Property	310	25-yr	2700.00	792.50	802.72	799.02	802.77	0.000416	2.74	2525.86	537.63	0.16
Jarrett Property	310	50-yr	3400.00	792.50	803.67	799.33	803.72	0.000393	2.85	3044.90	561.43	0.16
Jarrett Property	310	100-yr	4000.00	792.50	804.46	799.51	804.51	0.000370	2.92	3497.95	581.41	0.16
Jarrett Property	309	2-yr	900.00	792.40	799.25	796.49	799.53	0.002045	4.36	252.36	270.20	0.34
Jarrett Property	309	5-yr	1500.00	792.40	800.21	797.74	800.70	0.002925	5.83	345.03	379.71	0.41
Jarrett Property	309	10-yr	2000.00	792.40	800.96	798.60	801.57	0.003287	6.67	422.23	404.13	0.45
Jarrett Property	309	25-yr	2700.00	792.40	801.90	799.75	802.65	0.003564	7.56	520.90	552.14	0.48
Jarrett Property	309	50-yr	3400.00	792.40	802.69	800.50	803.58	0.003831	8.36	604.11	562.71	0.50
Jarrett Property	309	100-yr	4000.00	792.40	803.39	801.11	804.37	0.003886	8.86	677.21	570.78	0.51
Jarrett Property	308.5		Bridge									
Jarrett Property	308	2-yr	900.00	792.00	798.97	796.09	799.22	0.001791	4.14	270.79	185.36	0.32
Jarrett Property	308	5-yr	1500.00	792.00	799.68	797.38	800.18	0.003098	5.92	327.87	195.59	0.42
Jarrett Property	308	10-yr	2000.00	792.00	800.23	798.29	800.93	0.003953	7.08	373.53	202.71	0.49
Jarrett Property	308	25-yr	2700.00	792.00	800.89	799.15	801.88	0.005019	8.50	429.62	209.90	0.56
Jarrett Property	308	50-yr	3400.00	792.00	801.34	799.90	802.67	0.006325	9.93	468.63	216.97	0.63
Jarrett Property	308	100-yr	4000.00	792.00	801.79	800.47	803.36	0.007024	10.87	508.21	229.14	0.67
Jarrett Property	307	2-yr	900.00	791.90	798.89	795.99	799.12	0.001678	4.02	313.09	141.97	0.31
Jarrett Property	307	5-yr	1500.00	791.90	799.73	797.45	799.91	0.001542	4.24	913.66	527.24	0.30

HEC-RAS Plan: Proposed River: Pott Creek Reach: Jarrett Property (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)	
Jarrett Property	307	10-yr	2000.00	791.90	800.39	798.21	800.55	0.001380	4.29	1273.27	554.21	0.29
Jarrett Property	307	25-yr	2700.00	791.90	801.20	798.80	801.34	0.001203	4.32	1730.42	570.91	0.27
Jarrett Property	307	50-yr	3400.00	791.90	801.81	799.77	801.95	0.001184	4.51	2082.38	583.43	0.28
Jarrett Property	307	100-yr	4000.00	791.90	802.39	800.09	802.53	0.001091	4.53	2426.19	595.41	0.27
Jarrett Property	306	2-yr	900.00	791.60	798.57	795.69	798.71	0.001225	3.42	527.75	292.56	0.26
Jarrett Property	306	5-yr	1500.00	791.60	799.46	797.41	799.57	0.001082	3.56	1218.67	653.15	0.25
Jarrett Property	306	10-yr	2000.00	791.60	800.16	798.00	800.26	0.000943	3.57	1728.41	780.93	0.24
Jarrett Property	306	25-yr	2700.00	791.60	801.03	798.78	801.10	0.000740	3.43	2422.12	818.37	0.22
Jarrett Property	306	50-yr	3400.00	791.60	801.65	799.15	801.72	0.000701	3.51	2938.13	838.67	0.21
Jarrett Property	306	100-yr	4000.00	791.60	802.25	799.39	802.32	0.000623	3.46	3450.54	856.77	0.20
Jarrett Property	305	2-yr	900.00	791.40	798.23	795.49	798.42	0.001635	3.87	374.49	159.46	0.30
Jarrett Property	305	5-yr	1500.00	791.40	799.29	797.17	799.38	0.000845	3.16	1234.04	470.22	0.22
Jarrett Property	305	10-yr	2000.00	791.40	800.00	797.80	800.08	0.000805	3.31	1572.30	486.11	0.22
Jarrett Property	305	25-yr	2700.00	791.40	800.87	798.48	800.96	0.000762	3.48	2003.20	502.32	0.22
Jarrett Property	305	50-yr	3400.00	791.40	801.48	798.81	801.57	0.000812	3.78	2312.00	513.62	0.23
Jarrett Property	305	100-yr	4000.00	791.40	802.09	798.81	802.18	0.000787	3.90	2626.61	524.88	0.23
Jarrett Property	304	2-yr	900.00	791.00	798.14	795.09	798.16	0.000257	1.60	1695.61	774.14	0.12
Jarrett Property	304	5-yr	1500.00	791.00	799.19	796.82	799.20	0.000235	1.72	2513.89	793.35	0.12
Jarrett Property	304	10-yr	2000.00	791.00	799.90	797.12	799.92	0.000229	1.82	3083.84	806.46	0.12
Jarrett Property	304	25-yr	2700.00	791.00	800.78	797.50	800.79	0.000224	1.94	3798.58	823.07	0.12
Jarrett Property	304	50-yr	3400.00	791.00	801.38	797.51	801.40	0.000246	2.13	4296.89	834.49	0.13
Jarrett Property	304	100-yr	4000.00	791.00	801.99	797.64	802.01	0.000242	2.21	4809.46	846.08	0.13
Jarrett Property	303	2-yr	900.00	790.80	798.02	794.89	798.07	0.000521	2.30	1107.76	798.58	0.17
Jarrett Property	303	5-yr	1500.00	790.80	799.09	796.61	799.12	0.000419	2.32	2047.09	961.24	0.16
Jarrett Property	303	10-yr	2000.00	790.80	799.81	797.07	799.84	0.000356	2.29	2752.47	986.83	0.15
Jarrett Property	303	25-yr	2700.00	790.80	800.70	797.48	800.72	0.000305	2.29	3643.05	1020.95	0.14
Jarrett Property	303	50-yr	3400.00	790.80	801.30	797.93	801.32	0.000312	2.42	4260.70	1044.45	0.14
Jarrett Property	303	100-yr	4000.00	790.80	801.91	798.16	801.94	0.000288	2.44	4910.48	1066.96	0.14
Jarrett Property	302	2-yr	900.00	790.70	797.86	794.79	797.95	0.000833	2.89	761.46	444.96	0.22
Jarrett Property	302	5-yr	1500.00	790.70	798.94	796.12	799.02	0.000775	3.14	1268.23	499.10	0.22
Jarrett Property	302	10-yr	2000.00	790.70	799.67	797.34	799.75	0.000740	3.29	1645.90	535.90	0.21
Jarrett Property	302	25-yr	2700.00	790.70	800.56	797.80	800.64	0.000692	3.43	2143.20	571.64	0.21
Jarrett Property	302	50-yr	3400.00	790.70	801.15	798.14	801.24	0.000744	3.73	2484.15	591.39	0.22
Jarrett Property	302	100-yr	4000.00	790.70	801.77	798.39	801.86	0.000710	3.81	2857.25	612.28	0.22
Jarrett Property	301	2-yr	900.00	790.60	797.83	794.69	797.93	0.000913	3.05	643.26	329.91	0.23
Jarrett Property	301	5-yr	1500.00	790.60	798.88	795.94	799.00	0.000986	3.55	1023.27	393.60	0.24
Jarrett Property	301	10-yr	2000.00	790.60	799.59	797.15	799.73	0.001039	3.91	1342.58	504.38	0.25
Jarrett Property	301	25-yr	2700.00	790.60	800.50	797.70	800.62	0.000943	4.02	1847.93	582.07	0.25
Jarrett Property	301	50-yr	3400.00	790.60	801.09	798.12	801.22	0.000976	4.28	2195.15	597.34	0.25
Jarrett Property	301	100-yr	4000.00	790.60	801.71	798.45	801.84	0.000894	4.29	2576.21	613.66	0.25

Addendum

North Carolina Department of Cultural Resources
State Historic Preservation Office

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary
Office of Archives and History

Division of Historical Resources
David L. S. Brook, Director

May 5, 2004

Richard Mogensen
EarthMark Companies
9301 Aviation Blvd. Suite CE1
Concord, NC 28027

Re: Pott Creek II Mitigation Site, Stream Restoration, Catawba County, ER04-0672

Dear Mr. Mogensen:

Thank you for your letter of April 14, 2004, transmitting the archaeological management summary, concerning the above project.

The letter and management summary state that no archaeological sites were discovered in the proposed project area. A total of 82 shovel tests were excavated. We concur with the recommendation that no additional archaeological work is needed. Since no sites were found there is no need for a great deal of background. A short report with a map will be adequate. On April 26, 2004, a staff archaeologist left a voice mail message for Mr. Lee Tippett to this effect.

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.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

David Brook

cc: Lee Tippett, Louis Berger Group

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street
Asheville, North Carolina 28801

March 30, 2004

Mr. Thomas Barrett, Project Manager
Mulkey Engineers & Consultants
6750 Tryon Road
Cary, North Carolina 27511

Dear Mr. Barrett:

Subject: Pott Creek II Mitigation Site, Catawba County, North Carolina

You requested our review of the subject site, which is proposed as potential wetland mitigation in Catawba County, North Carolina. Specifically, you requested verification that no listed species or their critical habitat would be impacted by this project. No information was provided regarding any proposed activities for this site; therefore, our comments are primarily focused on listed species that may be found on the site. We request the opportunity to review future plans and provide more specific comments as more information becomes available about the site and its suitability for restoration. The following comments are provided in accordance with the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e), and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act).

Enclosed is a list of species from Catawba County that are on the *Federal List of Endangered and Threatened Wildlife and Plants*. Although our records for Catawba County indicate no known locations of listed species in the immediate project area, there are several occurrences of the federally threatened dwarf-flowered heartleaf (*Hexastylis nanaflora*) in the vicinity. The Pott Creek II site should be assessed and surveyed for protected species prior to any further planning or on-the-ground activities to ensure that no adverse impacts occur. If listed species are found on the site, further consultation will be required.

We appreciate the opportunity to provide these comments. If you have any questions or concerns, please contact Ms. Marella Buncick of our staff at 828/258-3939, Ext. 237. In any future correspondence concerning this project, please reference our log number 4-2-04-161.

Sincerely,

Brian P. Cole
Field Supervisor

Enclosure

ENDANGERED, THREATENED, AND CANDIDATE SPECIES AND FEDERAL SPECIES OF CONCERN, CATAWBA COUNTY, NORTH CAROLINA

This list was adapted from the North Carolina Natural Heritage Program's County Species List. It is a listing, for Catawba County, of North Carolina's federally listed and proposed endangered, threatened, and candidate species and Federal species of concern (for a complete list of rare species in the state, please contact the North Carolina Natural Heritage Program). The information in this list is compiled from a variety of sources, including field surveys, museums and herbaria, literature, and personal communications. The North Carolina Natural Heritage Program's database is dynamic, with new records being added and old records being revised as new information is received. Please note that this list cannot be considered a definitive record of listed species and Federal species of concern, and it should not be considered a substitute for field surveys.

Critical habitat: Critical habitat is noted, with a description, for the counties where it is designated or proposed.

Aquatic species: Fishes and aquatic invertebrates are noted for counties where they are known to occur. However, projects may have effects on downstream aquatic systems in adjacent counties.

COMMON NAME	SCIENTIFIC NAME	STATUS
CATAWBA COUNTY		
Invertebrates		
Catawba crayfish ostracod	*Dactyloctythere isabelae*	FSC
Vascular Plants		
Dwarf-flowered heartleaf	*Hexastylis naniflora*	Threatened
Sweet pinesap	*Monotropsis odorata*	FSC

KEY:

Status	Definition
Endangered	A taxon "in danger of extinction throughout all or a significant portion of its range."
Threatened	A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."
FSC	A Federal species of concern--a species that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing).

NCDENR
North Carolina Department of Environment and Natural Resources

Michael F. Easley, Governor

William G. Ross Jr., Secretary

March 31, 2004

Mr. Thomas B. Barrett
Mulkey Engineers & Consultants
6750 Tryon Road
Cary, NC 27511

Subject: Pott Creek II Mitigation Site – Stream Restoration Project; Catawba County

Dear Mr. Barrett:

The Natural Heritage Program has a record of the State Significantly Rare Santee chub (*Cyprinella zanema*) from Pott Creek at the SR 1217 bridge, just below the project area. It can be assumed to occur in the project site. Though our Program agrees with your letter dated March 12, 2004 that "no known federal or state protected species or their critical habitat are within 1.0 mile of this stream restoration project", based on a review of our Program's maps, we feel obligated to mention the presence of this rare, though not State-protected, fish species. If at all possible, stream impacts such as sedimentation should be avoided or minimized during construction of the project.

Although our maps do not show records of other natural heritage elements in the project area, it does not necessarily mean that they are not present. It may simply mean that the area has not been surveyed. The use of Natural Heritage Program data should not be substituted for actual field surveys, particularly if the project area contains suitable habitat for rare species, significant natural communities, or priority natural areas.

You may wish to check the Natural Heritage Program database website at <www.ncsparks.net/nhp/search.html> for a listing of rare plants and animals and significant natural communities in the county and on the topographic quad map. Please do not hesitate to contact me at 919-715-8697 if you have questions or need further information.

Sincerely,

Harry E. LeGrand, Jr.

Harry E. LeGrand, Jr., Zoologist
Natural Heritage Program

HEL/hel

1601 Mail Service Center, Raleigh, North Carolina 27699-1601
Phone: 919-733-4984 \ FAX: 919-715-3060 \ Internet: www.enr.state.nc.us/ENR/