STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

1534 MAIL SERVICE CENTER, RALEIGH, N.C. 27699-1534

W. LYNDO TIPPETT
SECRETARY

June 16, 2008

MEMORANDUM TO: Mr. Alan Thornburg, Member, Board of Transportation
Mr. J. J. Swain, Jr., P.E., Division Engineer, Division 13
Mr. Roberto Canales, P. E.
Mr. Calvin Leggett, P.E.
Mr. A. D. Allison, II
Ms. Deborah Barbour, P.E.
Mr. Jay Bennett, P.E.
Mr. Art McMillan, P.E.
Mr. W. F. Rosser, P.E.
Mr. A. L. Avant
Mr. Van Argabright, P.E.
Mr. Doug Lane
Ms. Carrie Runser-Turner
Mr. Mike Bruff, P.E. (electronic)
Mr. Kevin Lacy, P.E. Attention: Jim Dunlop, P.E. (electronic)
Dr. Gregory Thorpe Attention: Janice Stafford (electronic)

FROM: Ms. Lynnise M. Hawes, P.E.
Feasibility Studies Unit

SUBJECT: Feasibility Study FS-0513A; Proposed connector from Spring Creek Community to Marshall; Madison County

Our staff has completed a feasibility study for the proposed project referenced above. This brief analysis suggests improvements that would be logical if the project were to be funded. A copy of our report is attached for your information.

LMH/lmh

Attachment

PHONE 919-733-2039 FAX 919-733-3585

FEASIBILITY STUDY

Town of Marshall

Proposed Connector
from Spring Creek Community to Marshall

Madison County

Division 13

FS-0513A

Prepared by the
Program Development Branch
N. C. Department of Transportation

Lynnise M. Hawes

Lynnise M. Hawes, P.E.
Feasibility Studies Engineer

Derrick K Lewis

Derrick W. Lewis, P.E.
Feasibility Studies Unit Head

6/4/08
Date

Town of Marshall
Proposed Connector
from Spring Creek Community to Marshall

Madison County
FS-0513A

I. General Description

This feasibility study describes a proposed connector from Spring Creek to Marshall. The project location is shown on Figure 1. As part of the study, several different routes were investigated, the details of which are as follows:

- ***ALTERNATIVE 1:*** A proposed connector from NC 63 to US 25-70 utilizing existing SR 1135 (Little Pine Road), with the remainder on new location, a distance of approximately 10.9 miles.

- ***ALTERNATIVE 2:*** A proposed connector from NC 63-209 to US 25-70 utilizing existing SR 1151(Baltimore Branch Road/Big Pine Road/Barnard Road), SR 1145 (Sharp Hollow Road), SR 1144 (Loung Branch Creek Road), and SR 1143 (Lower Brush Creek Road), a distance of approximately 11.7 miles.

- ***ALTERNATIVE 3:*** A proposed connector from NC 63-209 to US 25-70 utilizing existing SR 1171 (Wooly Shot Road), SR 1153 (Rector Branch Road), SR 1151 (Big Pine Road/Barnard Road), SR 1145 (Sharp Hollow Road), SR 1144 (Loung Branch Creek Road), and SR 1143 (Lower Brush Creek Road), with the remainder on new location, a distance of approximately 8.8 miles.

This is the initial step in the planning and design process for this project and is not the product of exhaustive environmental or design investigations. The purpose of this study is to describe the proposed project including cost, and to identify potential problems that may require consideration in the planning and design phases.

II. Background

The purpose of this project is to provide an alternate route between NC 63-209 and US 25-70. This project will also promote a safer environment and better connectivity between Spring Creek Community and Marshall. Madison County officials and the Land-of-Sky Rural Planning Organization support this project.

SR 1135 (Little Pine Road) is designated as a rural local in the North Carolina Statewide Functional Classification System and as a major thoroughfare in the 1969 Marshall Thoroughfare Plan. SR 1135 is a two-lane shoulder section with pavement

widths varying from 18 to 22 feet from edge of pavement to edge of pavement. The development along SR 1135 is rural residential.

SR 1151 (Baltimore Branch Road/Big Pine Road/Barnard Road) is designated as a major collector in the North Carolina Statewide Functional Classification System. SR 1151 varies from an unpaved one-lane section and a two-lane shoulder section with travelway widths from 12 feet to 20 feet from edge of travelway to edge of travelway. The development along SR 1151 is rural residential.

SR 1145 (Sharp Hollow Road) is designated as a rural local in the North Carolina Statewide Functional Classification System. SR 1145 is a two-lane shoulder section with a pavement width of 20 feet from edge on pavement to edge of pavement. The development along SR 1145 is rural residential.

SR 1144 (Loung Branch Creek Road) is designated as a rural local in the North Carolina Statewide Functional Classification System. SR 1144 is a two-lane shoulder section with a pavement width of 22 feet from edge of pavement to edge of pavement. The development along SR 1144 is rural residential.

SR 1143 (Lower Brush Creek Road) is designated as a rural local in the North Carolina Statewide Functional Classification System. SR 1143 is a two-lane shoulder section with a pavement width of 22 feet from edge of pavement to edge of pavement. The development along SR 1143 is rural residential.

SR 1171 (Wooly Shot Road) is designated as a rural local in the North Carolina Statewide Functional Classification System. SR 1171 varies from an unpaved one-lane section to a two-lane shoulder section with travelway widths of 12 to 18 feet from edge of travelway to edge of travelway. The development along SR 1171 is rural residential.

SR 1153 (Rector Branch Road) is designated as a rural in the North Carolina Statewide Functional Classification System. SR 1153 is currently an unpaved two-lane section with a travelway width of 20 feet from edge of travelway to edge of travelway. The development along SR 1153 is rural residential.

The following are Transportation Improvement Program (TIP) projects located within the project corridor:

- TIP# R-2589: Upgrade NC 209 from NC 63 in Trust to US 25-70 in Hot Springs.
- TIP# B-3488: Replace Bridge No. 142 over the Big Pine Creek.
- TIP# B-3869: Replace Bridge No. 146 over the Big Pine Creek.
- TIP# B-4984: Replace Bridge No. 138 over the Big Pine Creek.

There are several existing bridges within the project study area. Please see attached Table 1 for detailed information on these structures.

It is anticipated that all alternatives for the proposed new connector will have railroad impacts, since they will intersect the Norfolk Southern Railways 'S' line. At these locations there is one track that carries approximately 12 trains per day at speeds averaging 35 miles per hour. Based on the Policies and Procedures manual, the exposure index for design year 2035 at these locations would be 256,000, which greatly surpasses the rural warrants of 15,000 for a grade separation.

III. Traffic and Safety

There is an existing traffic signal located at the intersection of US 25-70 and SR 1143 (Lower Brush Creek Road).

The estimated current year Average Daily Traffic (ADT) along Alternative 1 ranges from 800 vehicles per day (vpd) just east of NC 63 to 2,400 vpd just west of US 25-70. For the design year 2035, the traffic volume along Alternative 1 is estimated to range between 1,300 to 4,400 vpd. Truck traffic is estimated to make up approximately 3 percent of the daily traffic. In the design year 2035, Alternative 1 is projected to operate at a Level of Service (LOS) D or better.

The estimated current year Average Daily Traffic (ADT) along Alternative 2 ranges from 100 vehicles per day (vpd) just east of NC 63-209 to 1,300 vpd just west of SR 1144 (Loung Branch Creek Road). For the design year 2035, the traffic volume along Alternative 2 is estimated to range between 300 to 2,300 vpd. Truck traffic is estimated to make up approximately 3 percent of the daily traffic. In the design year 2035, Alternative 2 is projected to operate at a LOS D or better.

The estimated current year Average Daily Traffic (ADT) along Alternative 3 ranges from 800 vehicles per day (vpd) just east of NC 63-209 to 1,700 vpd just west of SR 1144 (Loung Branch Creek Road). For the design year 2035, the traffic volume along Alternative 3 is estimated to range between 1,000 to 2,400 vpd. Truck traffic is estimated to make up approximately 3 percent of the daily traffic. In the design year 2035, Alternative 3 is projected to operate at a LOS D or better.

Between 2004 and 2006, 10 crashes were reported along SR 1135. The crash rate for SR 1135 is 148.62 crashes per 100 million vehicle miles (crashes/100MVM) traveled. This rate is lower than the statewide rate of 370.44 crashes/100MVM for two-lane undivided rural secondary routes. There were 4 non-fatal injury crashes, 6 property damage only crashes, and no fatal crashes. The most prevalent types of crashes were Fixed Object (50%) and Overturn/Rollover (30%).

Between 2004 and 2006, 6 crashes were reported along SR 1151 from SR 1153 to SR 1145. The crash rate for this section of SR 1151 is 236.27 crashes/100MVM. This rate is lower than the statewide rate of 370.44 crashes/100MVM for two-lane undivided rural secondary routes. There were 2 non-fatal injury crashes, 4 property damage only crashes, and no fatal crashes. The most prevalent types of crashes were Overturn/Rollover (33%), and Head On (33%).

Between 2004 and 2006, 5 crashes were reported along SR 1151 from NC 209 to SR 1153. The crash rate for this section of SR 1151 is 56.67 crashes/100MVM. This rate is significantly lower than the statewide rate of 370.44 crashes/100MVM for two-lane undivided rural secondary routes. There were 2 non-fatal injury crashes, 3 property damage only crashes, and no fatal crashes. The most prevalent type of crash was Overturn/Rollover (40%).

Between 2004 and 2006, 4 crashes were reported along SR 1145 from SR 1151 to SR 1144. The crash rate for SR 1145 is 405.52 crashes/100MVM. This rate is higher than the statewide rate of 370.44 crashes/100MVM for two-lane undivided rural secondary routes. There were no non-fatal injury crashes, 4 property damage only crashes, and no fatal crashes. The most prevalent type of crash was Fixed Object (50%).

Between 2004 and 2006, no crashes were reported along SR 1144 from SR 1145 to SR 1143.

Between 2004 and 2006, 3 crashes were reported along SR 1143 from SR 1144 to US 25-70. The crash rate for SR 1143 is 263.19 crashes/100MVM. This rate is slightly lower than the statewide rate of 370.44 crashes/100MVM for two-lane undivided rural secondary routes. There was 1 non-fatal injury crash, 2 property damage only crashes, and no fatal crashes. The types of crashes were Fixed Object and Left Turn.

Between 2004 and 2006, 1 non-fatal injury crash was reported along SR 1171. This crash was an Overturn/Rollover type of crash.

Between 2004 and 2006, no crashes were reported along SR 1153.

IV. Description of Alternatives

It is proposed to construct a connector from Spring Creek Community to Marshall. The project location is shown on Figure 1.

ALTERNATIVE 1: This alternative proposes a new connector from NC 63 to US 25-70 utilizing existing Little Pine Road, with the remainder on new location, a distance of approximately 10.9 miles. Included in the costs below are three (3) new bridges over Little Pine Creek and the extension of an existing culvert (Bridge No. 532) at Little Pine Creek.

Cross-section: Two-lane shoulder section, 32' from edge of pavement to edge of pavement, with 12' lanes and 8' shoulders (4' of which are paved) on 100' right-of-way.

With this proposed cross-section, it is anticipated that there will be twenty-three (23) residences and one (1) business relocated due to this project. The total cost of this alternative, including construction, utility relocation, and right-of-way, is estimated to be $45,400,000.

Right-of-way	$7,100,000
Utility Relocation	$1,200,000
Construction	$37,100,000
Total Cost (Alternative 1)	$45,400,000

ALTERNATIVE 2: This alternative proposes a new connector from NC 63-209 to US 25-70 utilizing existing SR 1151 (Baltimore Branch Road/Big Pine Road/ Barnard Road), SR 1145 (Sharp Hollow Road), SR 1144 (Loung Branch Creek Road), and SR 1143 (Lower Brush Creek Road), a distance of approximately 13.0 miles. Included in the costs below are twelve (12) new bridges over Big Pine Creek, two (2) new bridges over Brush Creek, the removal of Bridge 138, and the replacement of the following bridges:

- No. 113 over French Broad River
- No. 114 and No. 166 over Brush Creek
- No. 115 over Branch of Brush Creek
- No. 139, No. 141, No. 142, No. 143, No. 144, No. 145 and No. 146 over Big Pine Creek
- No. 216 over Baltimore Branch
- No. 222 over Branch of Big Pine Creek
- No. 331 over Prong of Big Pine Creek

The following Y-Line intersection realignments are recommended and are included in the costs shown below:

- SR 1151 (Barnard Road)
- SR 1158 (South Fork Road)
- SR 1159 (North Fork Road)

Cross-section: Two-lane shoulder section, 32' from edge of pavement to edge of pavement, with 12' lanes and 8' shoulders (4' of which are paved) on 100' right-of-way.

With this proposed cross-section, it is anticipated that there will be fifty (50) residences and three (3) businesses relocated due to this project. The total cost of this alternative, including construction, utility relocation, and right-of-way, is estimated to be $64,400,000.

Right-of-way	$9,300,000
Utility Relocation	$1,700,000
Construction	$53,400,000
Total Cost (Alternative 2)	$64,400,000

ALTERNATIVE 3: This alternative proposes a new connector from NC 63-209 to US 25-70 utilizing existing SR 1171 (Wooly Shot Road), SR 1153 (Rector Branch Road), SR 1151 (Big Pine Road/Barnard Road), SR 1145 (Sharp Hollow Road), SR 1144 (Loung Branch Creek Road), and SR 1143 (Lower Brush Creek Road), with the remainder on new location, a distance of approximately 9.1 miles. Included in the costs below are four (4) new bridges over Big Pine Creek, two (2) new bridges over Brush Creek, the removal of Bridge No. 138, and the replacement of the following bridges:

- No. 113 over French Broad River
- No. 114 and No. 166 over Brush Creek
- No. 115 over Branch of Brush Creek
- No. 139, No. 141, No. 142, No. 143, No. 144, No. 145, and No. 146 over Big Pine Creek
- No. 216 over Baltimore Branch
- No. 222 over Branch of Big Pine Creek
- No. 331 over Prong of Big Pine Creek

The following Y-Line intersection realignments are recommended and are included in the costs shown below:

- SR 1151 (Big Pine Road)
- SR 1151 (Barnard Road)

Cross-section: Two-lane shoulder section, 32' from edge of pavement to edge of pavement, with 12' lanes and 8' shoulders (4' of which are paved) on 100' right-of-way.

With this proposed cross-section, it is anticipated that there will be forty-one (41) residences and two (2) businesses relocated due to this project. The total cost of this alternative, including construction, utility relocation, and right-of-way, is estimated to be $75,500,000.

Right-of-way	$7,600,000
Utility Relocation	$1,500,000
Construction	$66,400,000
Total Cost (Alternative 3)	$75,500,000

V. Community Issues

A detailed investigation was not conducted for this feasibility; however there is a cemetery and a church within the proposed project study area. No impacts to schools or community facilities are anticipated with this project.

The project corridor crosses a land trust priority area.

Alternative 3 crosses a section of the Pisgah National Forest, which is classified as federal owned game lands.

Maps at the Survey and Planning Branch of the North Carolina State Historic Preservation Office were used to determine if any historic properties on the National Register of Historic Places (NRHP) or state study lists exist within the proposed project study area. No properties within the proposed project study area were found to be either on the NRHP or state study lists.

VI. Natural Environment Issues

The following is a preliminary review of environmental issues that might have a potential impact to the project. The information obtained for the environmental screening is from a Geographic Information System (GIS) database. The purpose of the environmental screening is to identify potential environmental issues early in the process.

Stream Classification

The proposed project study area is located in the French Broad River Basin. There are several water bodies within the proposed project study area. Please see the attached Table 4 for a comprehensive list. These water bodies will likely need to be surveyed and have the appropriate coordination with the North Carolina Department of Environment and Natural Resources (NCDENR) and the U.S. Army Corps of Engineers (USACE) during any environmental document study.

Wetlands

The potential wetland impacts within the proposed project study area are the wetlands associated with the numerous water bodies impacted by this project. Permitting with the U.S. Army Corps of Engineers (USACE) will likely need to be obtained before construction of the project, and appropriate mitigation measures should be taken if deemed necessary.

Threatened and Endangered Species

There are several threatened and endangered species identified in the proposed project study area. Please see attached Table 3 for a comprehensive list. There are several Significant Natural Heritage Areas identified in the proposed project study area. Please see Table 4 for a comprehensive list. The French Broad River is designated as a Wildlife Resources Commission Trout Area.

VII. Recommendations

ALTERNATIVE 1: It was found that the two-lane shoulder section would be able to accommodate the projected 2035 design year traffic volumes with an acceptable level of service. This alternative is least expensive and has the lowest anticipated right-of-way impacts. This alternative also carries the highest projected traffic volumes when compared to the other alternatives. ***Because of the factors, Alternative 1 would be the preferred alternative for the proposed connector.***

ALTERNATIVE 2: It was found that the two-lane shoulder section would be able to accommodate the projected 2035 design year traffic volumes with an acceptable level of service.

ALTERNATIVE 3: It was found that the two-lane shoulder section would be able to accommodate the projected 2035 design year traffic volumes with an acceptable level of service.

The total estimated cost for the recommended Alternative 1, a two-lane shoulder section, with 12' lanes and 8' shoulders (4' of which are paved) on variable width right-of-way, the extension of Culvert No. 532, and two new bridges is $45,400,000.

FS-0513A: Proposed Connector from Spring Creek Community to Marshall

Table 1: Existing Bridge Information

Structure Number	Facility Carried	Feature Intersected	Structure Description	Structure Length	Horizontal Clearance	Year Constructed	Sufficiency Rating
C41	US 25-70	Brush Creek	Triple 9' x 8' RCBC	32'	24.5'	1959	99.2
102	SR 1135	French Broad River/RR	RC floor and PPC deck panels on PPC girders	722'	24.0'	1987	83.7
105	SR 1135	Little Pine Creek	Steel plank floor on I-beams	57'	27.3'	1951	95.0
P107	SR 1135	Little Pine Creek	Single 38'-3" x 11'-1" structural steel plate arch	39'	20.0'	1983	99.9
C112	SR 1155	Big Pine Creek	Double 15' x 14' RCBC	32'	16.0'	1977	91.6
113	SR 1151	French Broad River	RC floor on I-beams	56'	30'	1977	90.8
114	SR 1151	Brush Creek	Timber floor on salvaged I-beams	36'	24.3'	1972	78.1
115	SR 1145	Branch of Brush Creek	Timber floor on timber joists	18'	19.1'	1963	50.7
116	SR 1144	Brush Creek	Timber floor on salvaged I-beams	22'	19.1'	1956	59.8
119	SR 1151	Spring Creek	Prestressed concrete cored slab	91'	28.9'	1977	96.3
138	SR 1151	Big Pine Creek	Timber floor on I-beams	41'	22.8'	1973	30.6
139	SR 1151	Big Pine Creek	Timber floor on I-beams	41'	24.7'	1973	53.8
141	SR 1151	Big Pine Creek	Timber floor on I-beams	38'	19.1'	1951	48.5
142	SR 1151	Big Pine Creek	Timber floor on I-beams	41'	24.2'	1951	8.4
143	SR 1151	Big Pine Creek	Timber floor on I-beams	31'	19.3'	1951	53.7

FS-0513A: Proposed Connector from Spring Creek Community to Marshall

Table 1 (Continued): Existing Bridge Information

Structure Number	Facility Carried	Feature Intersected	Structure Description	Structure Length	Horizontal Clearance	Year Constructed	Sufficiency Rating
144	SR 1151	Big Pine Creek	Timber floor on I-beams	26'	24.0'	1951	51.4
145	SR 1151	Big Pine Creek	Timber floor on I-beams	31'	19.9'	1951	72.6
146	SR 1151	Big Pine Creek	Timber floor on salvaged I-beams	31'	19.2'	1951	45.6
216	SR 1151	Baltimore Branch	Timber floor on timber joists	21'	15.6'	1962	78.1
217	SR 1151	Baltimore Branch	Prestressed concrete cored slab	28'	24.2'	1998	93.7
222	SR 1151	Branch of Big Pine Creek	Timber floor on salvaged I-beams	22'	16.8'	1951	56.1
331	SR 1159	Prong Big Pine Creek	3 Sub. & 2 top. diag. floor on I-beams	26'	19.2'	1963	54.0
C532	SR 1135	Little Pine Creek	Triple 13' x 10' RCBC	43'	21.0'	1988	99.8

FS-0513A: Proposed Connector from Spring Creek Community to Marshall

Table 2: Waterbodies Within the Proposed Project Study Area

Feature Name	DWQ Classification		Feature Name	DWQ Classification
French Broad River	C		Sugarcamp Branch	C
Anderson Branch	C		Hogskin Branch	C
Walnut Creek	C		Back Branch	C
Dry Branch	C		Indian Camp Branch	C
Brush Creek	C		Rector Branch	C
Thomas Branch	C		Baker Branch	C
Little Pine Creek	C		Gentry Branch	C
South Prong Little Pine Creek	C		Levi Branch	C
North Prong Little Pine Creek	C		Spring Creek	C TR
Caney Fork	C		Baltimore Branch	C
High Shoal Branch	C		Fall Branch	C
Rough Branch	C		Friezeland Creek	C TR
Big Pine Creek	C		Tug Fork	C TR
North Fork Big Pine Creek	C		Puncheon Camp Branch	C
South Fork Big Pine Creek	C		Coonpatch Branch	C

FS-0513A: Proposed Connector from Spring Creek Community to Marshall

Table 3: Threatened and Endangered Species Within the Proposed Project Study Area

Common Name	Scientific Name	Federal Status	State Status
Piratebush	*Buckleya distichophylla*	FSC	E
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii rafinesquii*	FSC	T
Hellbender	*Cryptobranchus alleganiensis*	FSC	SC
Paddlefish	*Polyodan spathula*	FSC	E
Carolina Saxifrage	*Saxifraga caroliniana*	FSC	SR-T
Climbing Fumitory	*Adlumia fungosa*	None	SR-P
Freshwater Drum	*Aplodinotus grunniens*	None	T
Tower-Mustard	*Arabis glabis*	None	SR-P
Wood Sedge	*Carex leptonervia*	None	SC
Bleeding Heart	*Dicentra eximia*	None	SR-P
Mooneye	*Hiodon tergisus*	None	SR-P
Largeleaf Waterleaf	*Hydrophyllum macrophyllum*	None	SR-P
Least Weasel	*Mustela nivals*	None	SC
Logperch	*Percina caprodes*	None	T
Sauger	*Sander canadensis*	None	SR
Sweet White Trillium	*Trillium simile*	None	SR-L

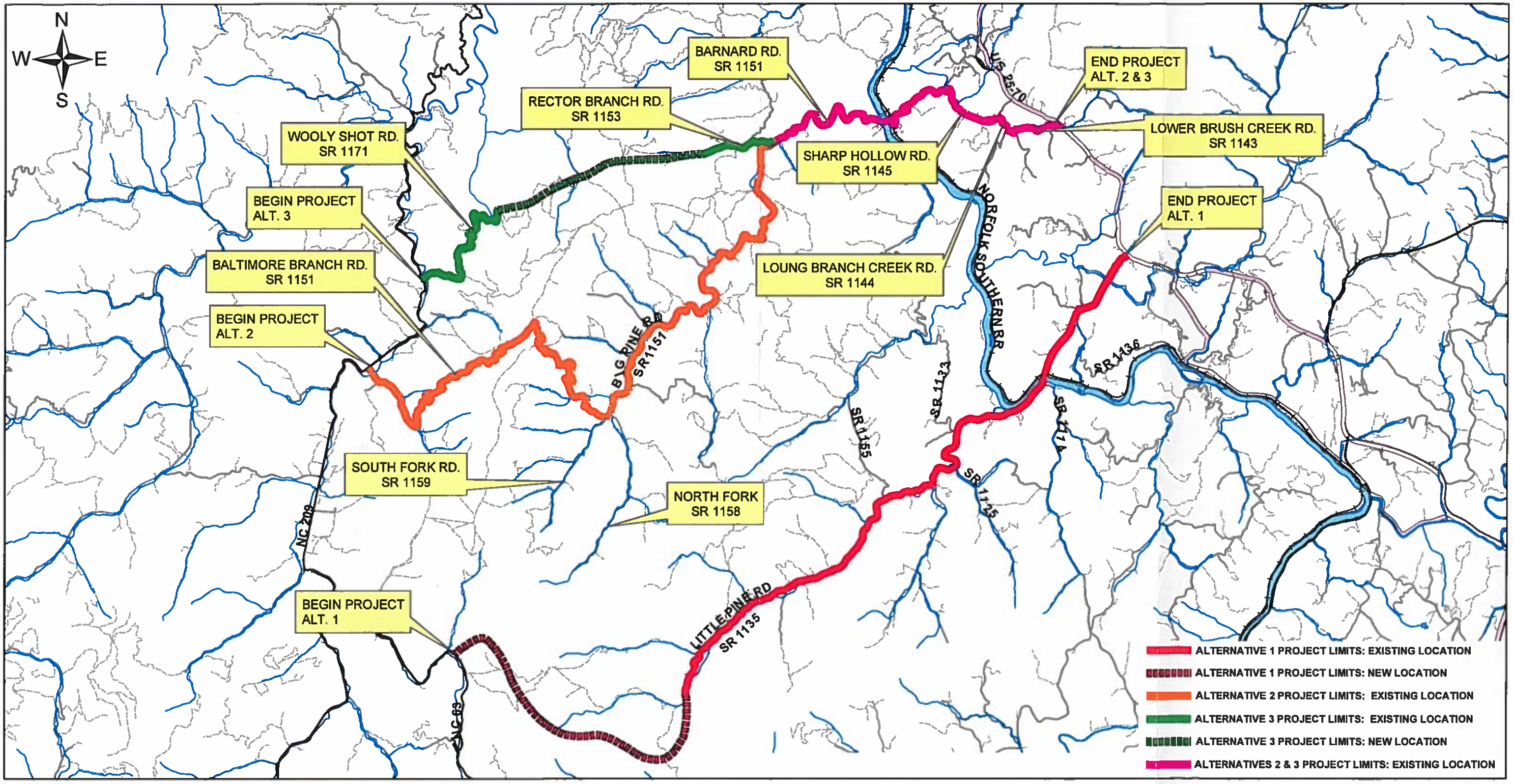
Definitions of Federal Status:FSC=Federal "Species of Concern"

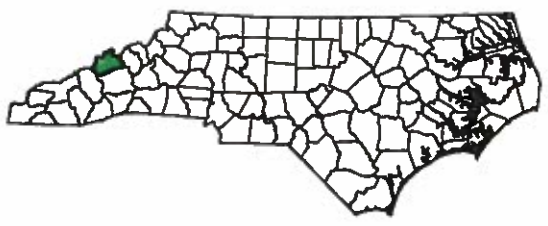
Definitions of State Status:E=Endangered, T=Threatened, SR=Significantly Rare,

SC=Special Concern, -P=Peripheral, -L=Limited in NC, -T=Throughout the species

Table 4: Significant Natural Heritage Areas Within the Proposed Project Study Area

Name
Acidic Cove Forest
Hot Springs Window Macrosite
Lower French Broad River Aquatic Habitat
Pisgah National Forest
Rich Cove Forest
Sring Creek Mountain





0 5,000 10,000 20,000

Feet

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH

FS-0513A

NEW CONNECTOR
FROM MARSHALL TO SPRING CREEK COMMUNITY

MADISON COUNTY

DIVISION 13 FIGURE 1