

Combined Concurrence

Point 2/2A Meeting

NC 143 Improvements

From West Buffalo Creek to NC 143 Business, west of Robbinsville

Graham County

WBS No. 34508.1.1

STIP Project No. R-2822B



March 22, 2018 at 10:00 a.m.
North Carolina Department of Transportation
Structures Conference Room C, NCDOT Century Center Building A
1000 Birch Ridge Drive, Raleigh, NC 27610

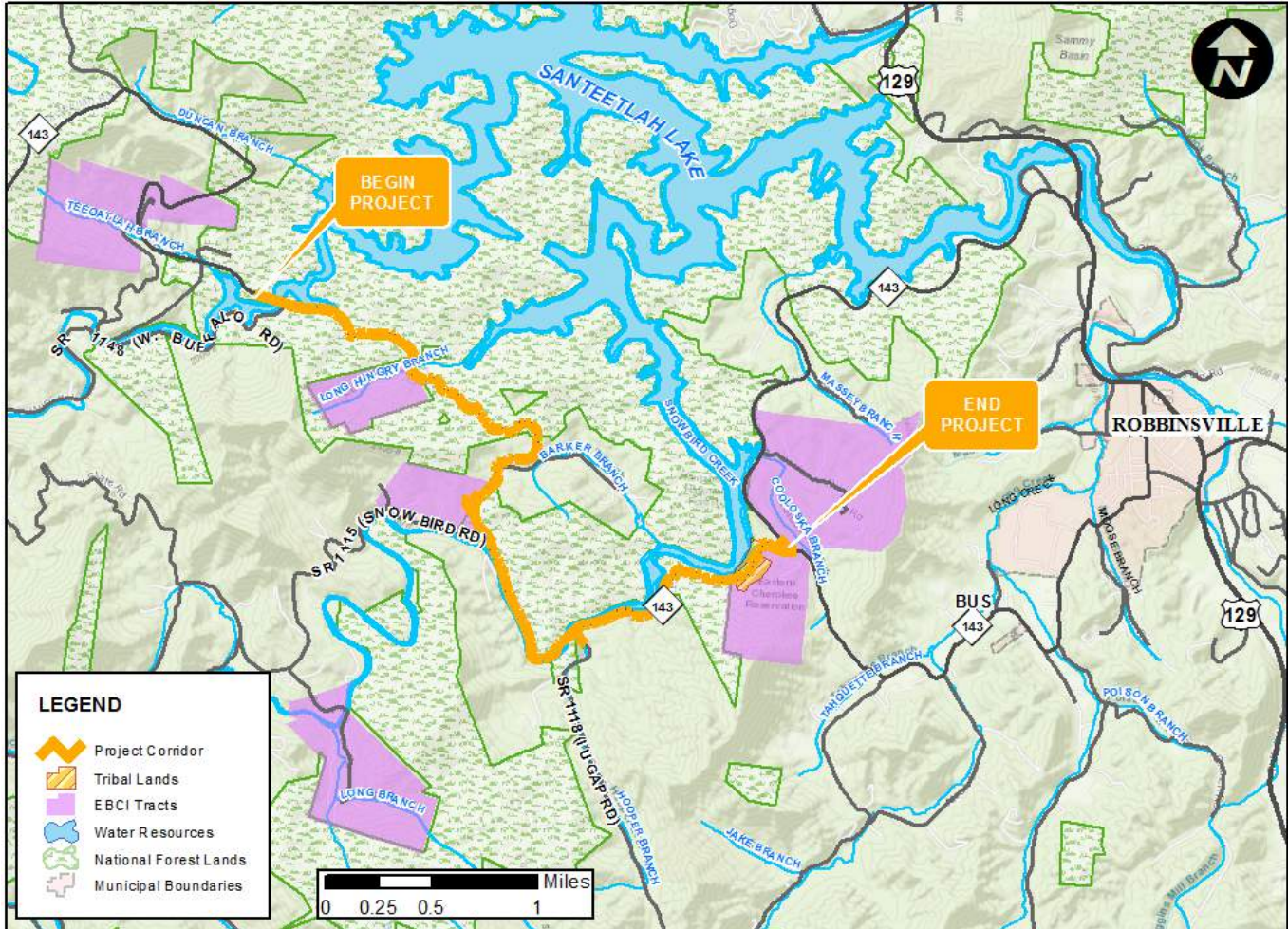
Prepared By
Stantec Consulting Services, Inc.
801 Jones Franklin Road, Suite 300
Raleigh, NC 27606
919-851-6866



1.0 Project Description

The North Carolina Department of Transportation (NCDOT) proposes to make safety improvements along NC 143 from West Buffalo Creek to NC 143 Business, near Robbinsville in Graham County. The project corridor is approximately 4.5 miles long. The project location is shown below in Figure 1. This project is included in the 2018 - 2027 State Transportation Improvement Program (STIP) as Project R-2822B.

Figure 1: Project Vicinity Map



2.0 Nearby STIP Projects

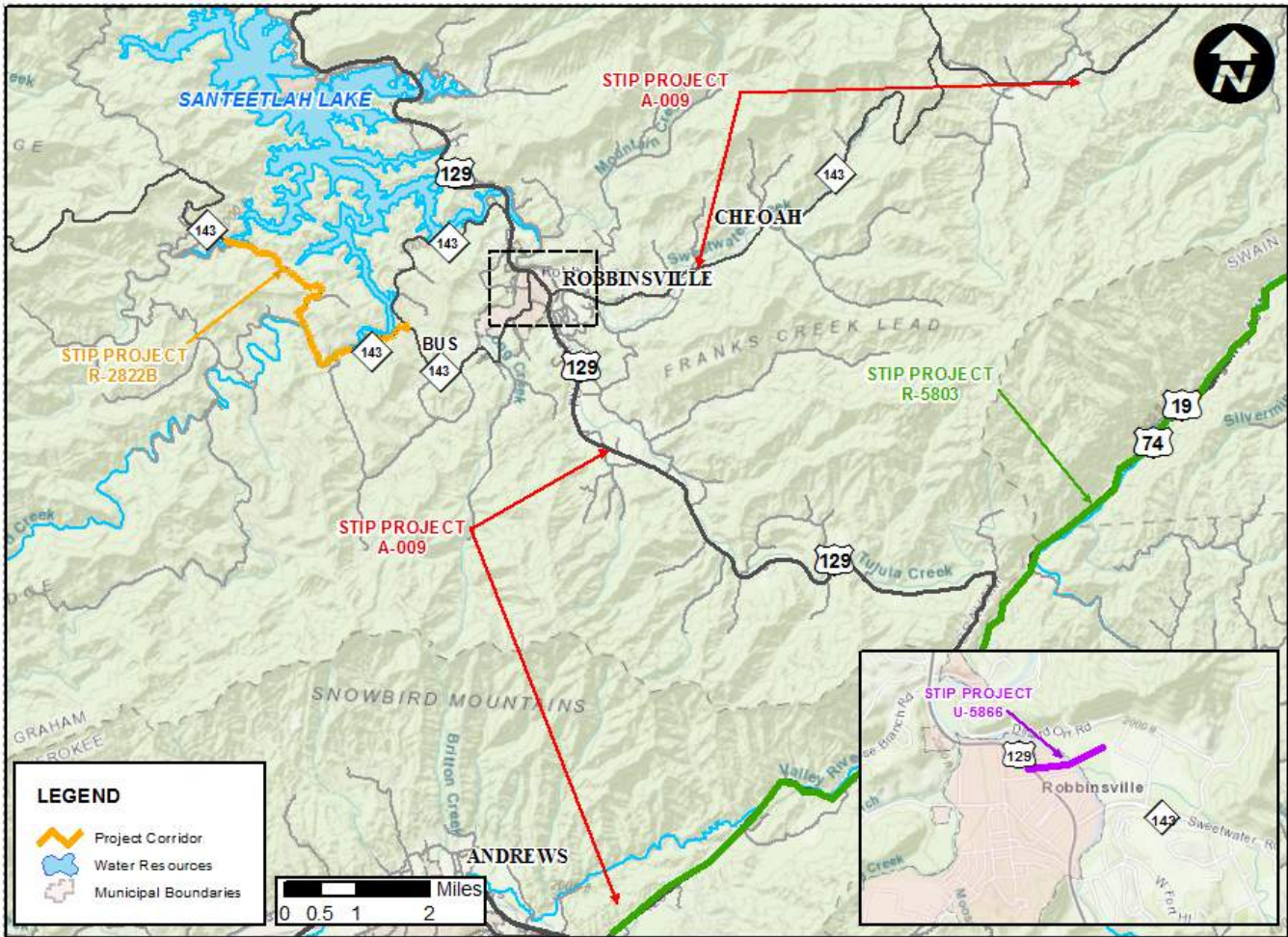
The NCDOT 2018 – 2027 STIP includes three projects in the general project area. These projects are listed in Table 1 and identified by location in Figure 2

Table 1: Nearby STIP Projects

STIP Project Number	Project Description	Schedule (Fiscal Year)
A-0009	US 19/74/129 at Andrews to NC 28 east of Almond, construct four-lane divided facility.	Right of way: 2024 Construction: 2024
R-5803	US 19/74: From the end of divided highway in Cherokee County to beginning of divided highway in Almond, construct 5-foot wide paved shoulders, construct climbing lanes near mile marker 48, and auxiliary lanes at the Cherokee-Macon County Line	Right of way: 2023 Construction: 2025
U-5866	US 129 to Robbinsville High School, new route including bridge over the Cheoah River	Construction: 2018



Figure 2: Nearby STIP Projects



3.0 Purpose and Need and Study Area (Concurrence Point 1)

“The purpose of the project is to achieve the minimum geometric standards consistent with the facility’s functional classification.”

NC 143 is classified as a rural major collector. The purpose of the rural major collector is to link population and employment centers or to provide connectivity to higher classified roadways (arterials and freeways).

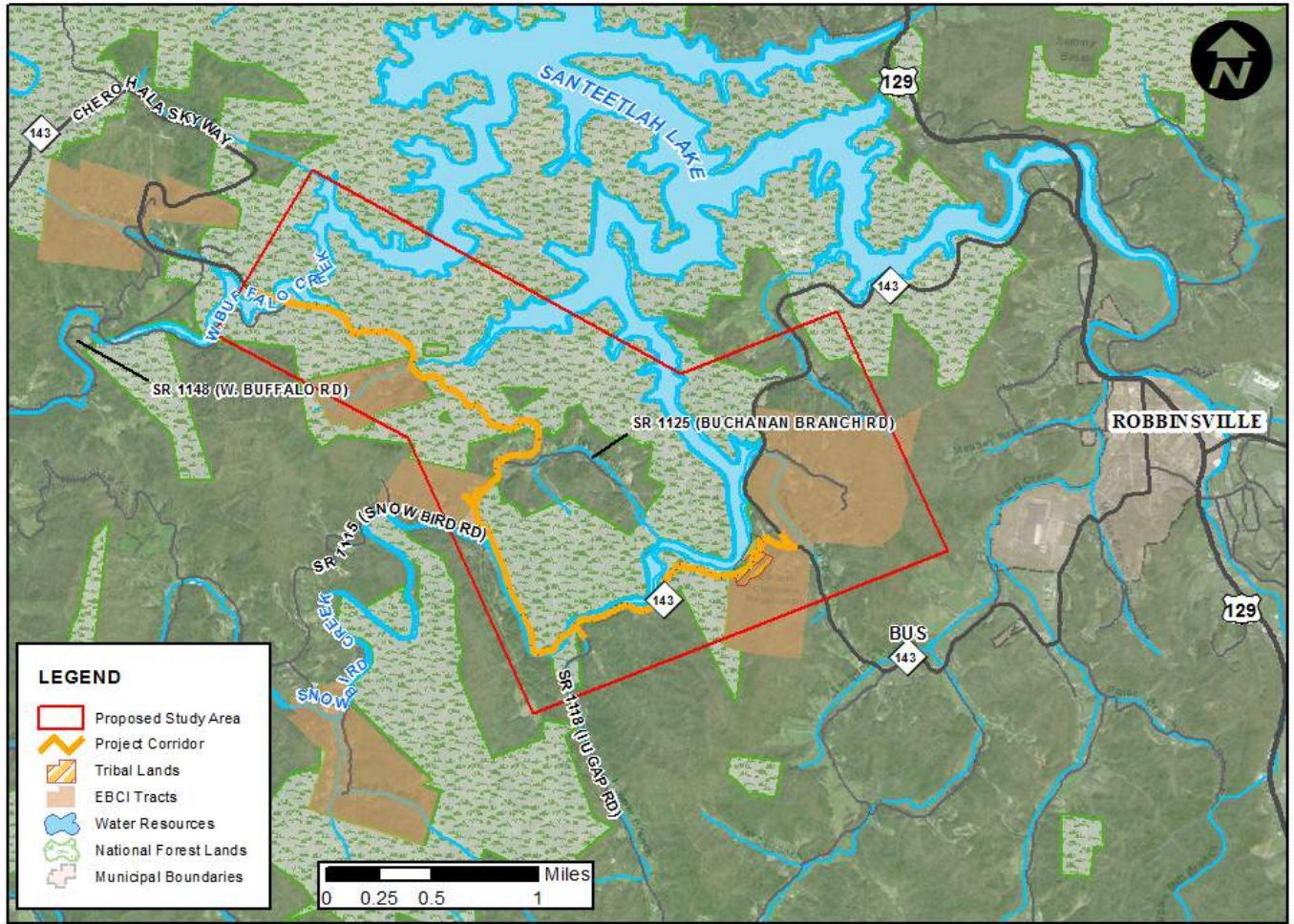
The minimum geometric standards are defined as the recommended pavement width and horizontal and vertical curve design speed as it applies to rural major collectors per the AASHTO Green Book and the Resurfacing, Restoration, and Rehabilitation (3-R) design standards.

Roadway deficiencies are defined as:

- Substandard pavement width: < 11-foot wide travel lanes and 6-foot wide shoulders
- Substandard horizontal and vertical curves: < 35 mph design speed



Figure 3: Project Study Area



4.0 Alternatives Carried Forward for Detailed Study (Concurrence Point 2)

The following sections describe the alternatives evaluated for the proposed project and identifies the alternatives to be carried forward for detailed study.

4.1 No-Build Alternative

The Non-Build alternative consists only of routine maintenance along NC 143 within the project study area. This alternative does not include any pavement widening or modifications to the existing vertical or horizontal alignment.

4.2 Alternative Modes of Transportation

Graham County Transit is the public transportation service provider for Graham County. It currently operates 5 mini-vans, 3 high-top handicap accessible vans, and one 20-seat bus. Daily service is provided to Andrews, Marble, and Cherokee. In additions, schedule service is also provided to Asheville, Bryson City, Sylva, Waynesville, Murphy, and Hayesville. Regularly scheduled service begins at 5:30 am and ends at 5:00 pm.

Regularly scheduled service along the project corridor is not provided. Patrons along the corridor can call to request a pick up and a pick-up appointment time is provided.

4.3 Build Alternatives

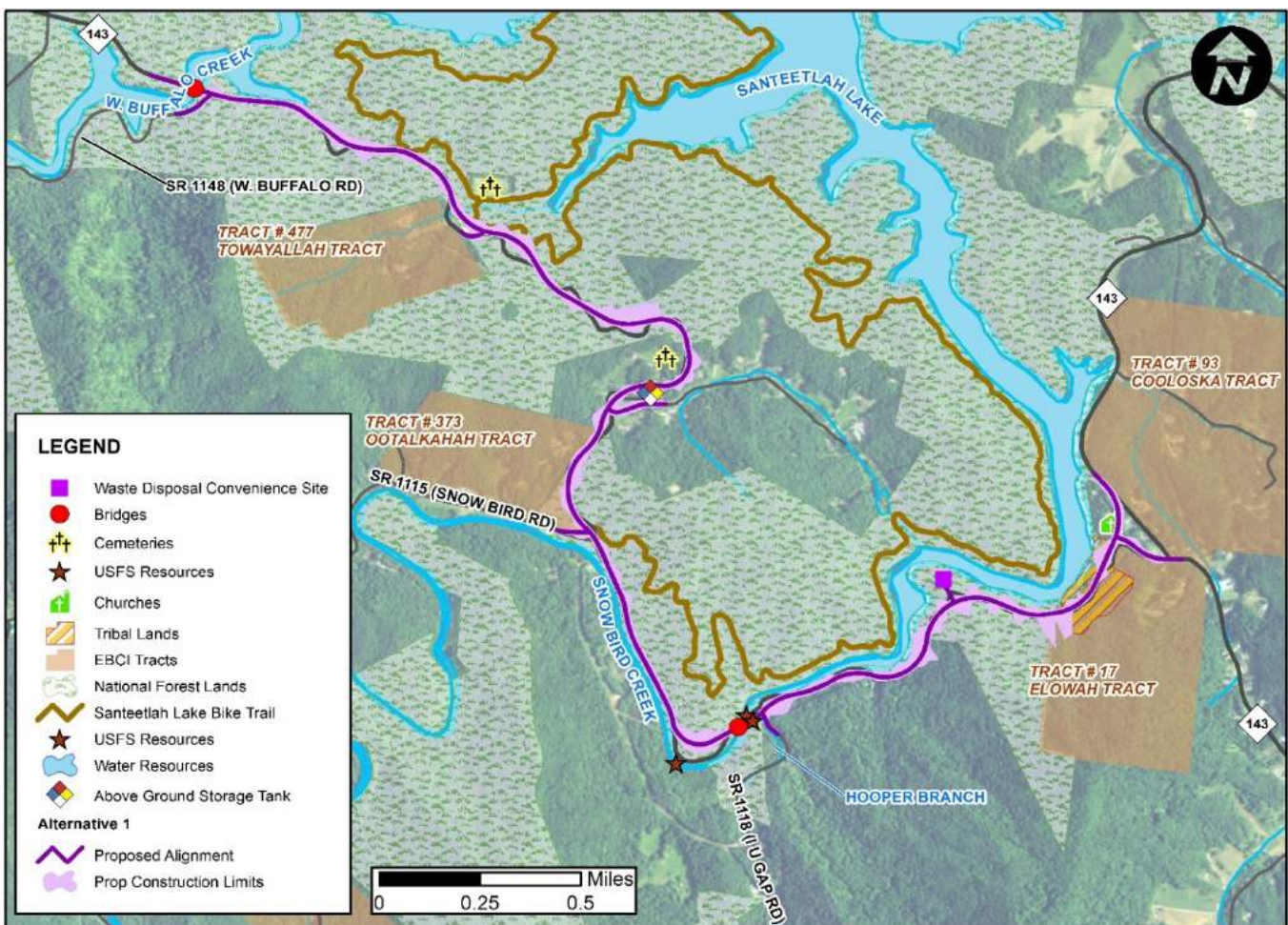


Four Build alternatives were developed for this project and were based off of the recommended design criteria stated in the AASHTO Green Book and NCDOT 3-R Design Guide for Rural Collectors.

Alternative 1

Alternative 1 proposes to widen existing NC 143 from West Buffalo Creek to just north of NC 143 Business. This alternative proposes to upgrade NC 143, improving all vertical and horizontal curves to meet a minimum design speed of 45-mph. These improvements are consistent with the minimum recommendations for a Rural Collector as described in the AASHTO Green Book. The proposed widening design includes 11-foot travel lanes and 6-foot wide shoulders (4-foot paved) in each direction. The 11-foot travel lanes do not, however, meet the minimum recommendations in the AASHTO Green Book, but are consistent with the minimum lane and shoulder widths recommended by the NCDOT 3-R Guide. The proposed design also reconfigures the NC 143/NC 143 Business intersection by rerouting NC 143 on new location to make it the primary through movement. Figure 4 shows the proposed alignment of Alternative 1.

Figure 4: Alternative 1



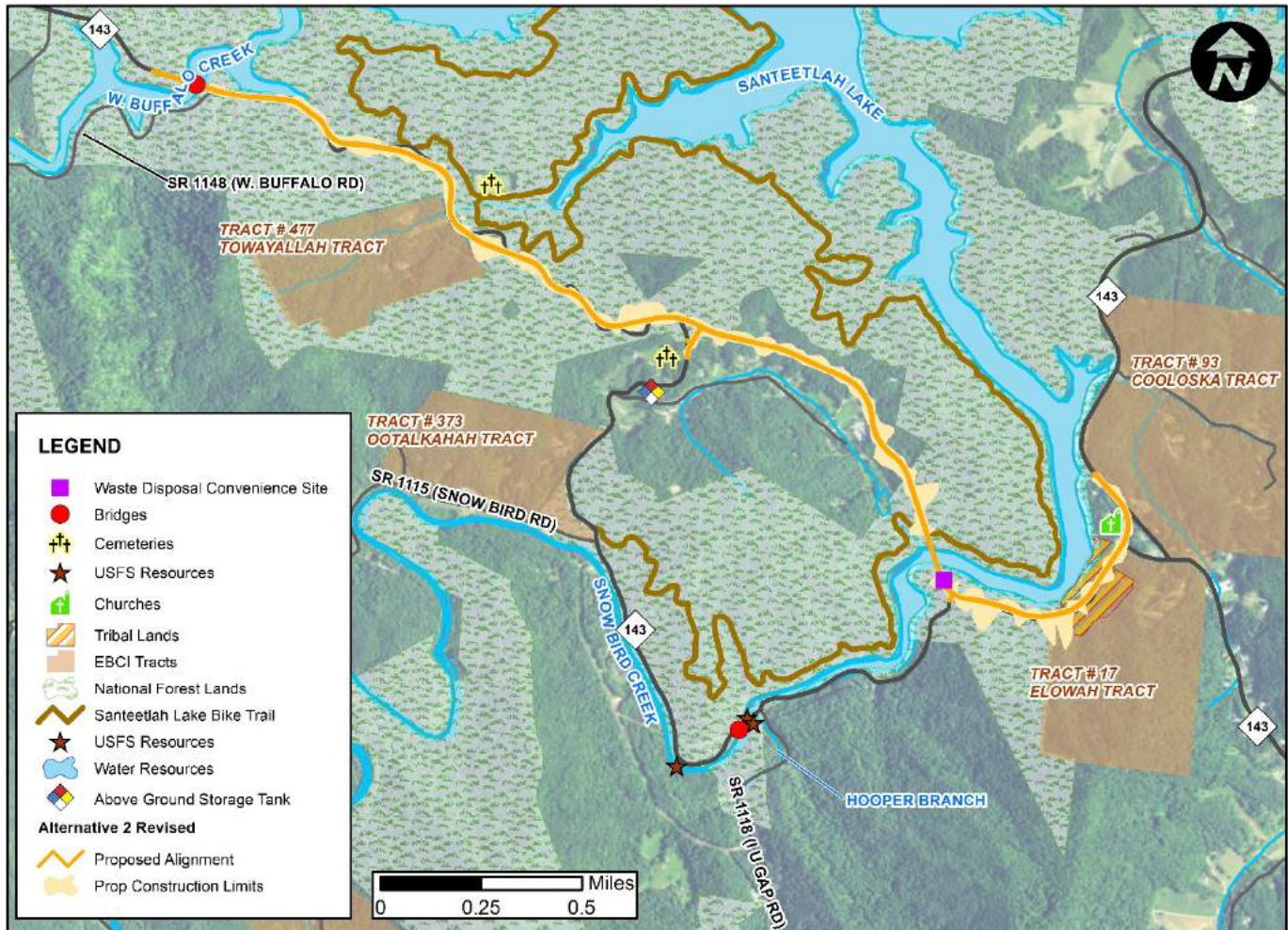
Alternative 2 Revised

Alternative 2-Revised proposes to widen NC 143 from West Buffalo Creek to near the Carver cemetery. A new alignment segment is proposed to the north and east of the existing NC 143 from near the Chickalelee Cemetery to near the Graham County Waste Convenience Site. This alignment includes a new crossing of Santeetlah Lake and will include horizontal and vertical alignment improvements along existing NC 143 from near the Graham County Waste Convenience Site to the NC 143 Business intersection. Alternative 2 was developed as an avoidance alternative due to potential impacts to the Snowbird Picnic Area. The alternative will upgrade NC 143, ensuring that all the vertical and horizontal curves have a minimal design speed of 35-mph, and widen NC 143 to have 11-foot travel lanes and 6-foot wide shoulders (4-foot paved) in each direction. These



improvements meet the minimum recommendations provided in the NCDOT 3-R Guide for a Rural Collector. The alternative will also reconfigure the NC 143/NC 143 Business intersection by rerouting NC 143 on new location to make it the primary through movement. Figure 5 shows the proposed alignment for Alternate 2-Revised.

Figure 5: Alternative 2 - Revised

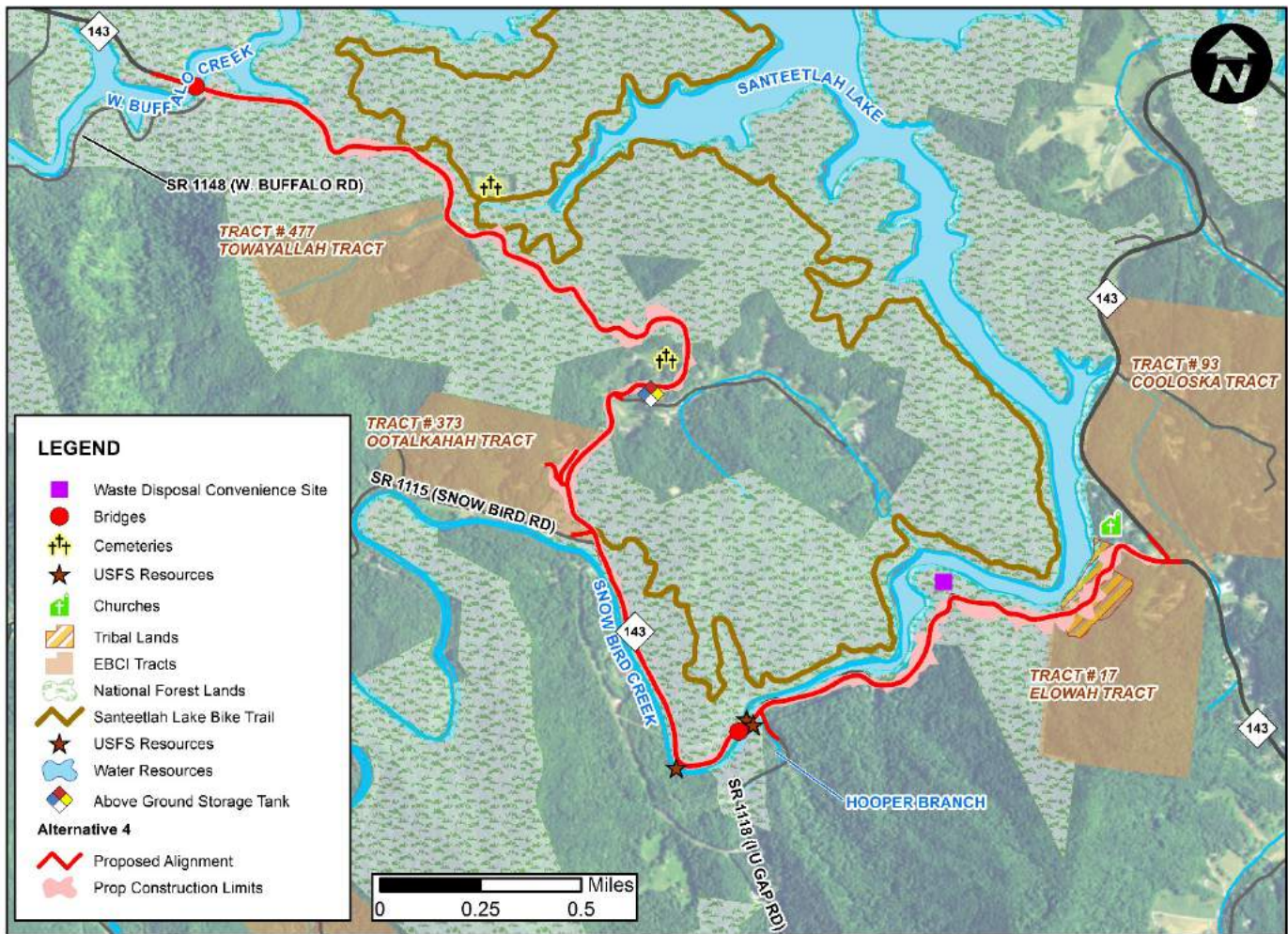


Alternative 4

Alternative 4 proposes to widen the roadway (consisting of two 11-foot travel lanes and 6-foot wide shoulders (4-foot paved)) from West Buffalo Creek to just north of NC 143 Business. The pavement widening is consistent with the minimum pavement width recommendations for a Rural Collector as stated in the 3-R guidance. This alternative does not, however, modify any of the horizontal or vertical curves along NC 143. Alternative 4 is considered a Transportation System Management (TSM) Alternative, which seeks to maximize the existing transportation infrastructure by using low-cost improvements such as minor geometric improvements, shoulder and lane widening, and signal improvements. Figure 6 shows the proposed alignment of Alternative 4.



Figure 6: Alternative 4

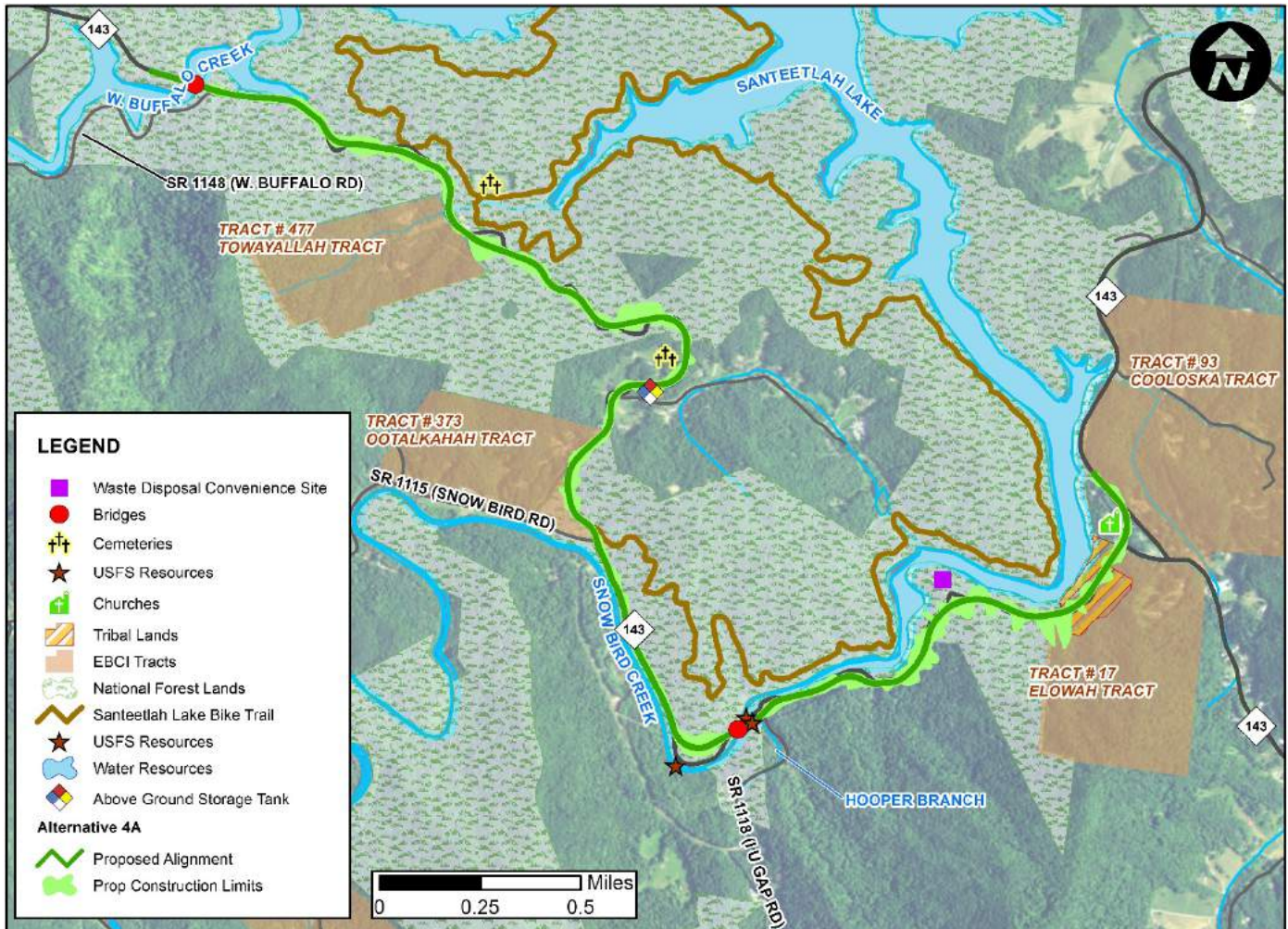


Alternative 4A

Alternative 4 proposes to widen existing NC 143 from West Buffalo Creek to just north of NC 143 Business. Proposed improvements include upgrading NC 143 to ensure that all vertical and horizontal curves have a minimal design speed of 35-mph. Widening improvements include two, 11-foot lanes and 6-foot wide shoulders (4-foot paved), which is consistent with the minimal recommendations for a Rural Collector in the NCDOT 3-R guidance. The proposed design also includes reconfiguring NC 143/NC 143 Business intersection by rerouting NC 143 on new location to make it the primary through movement. Figure 7 shows the proposed alignment of Alternative 4A.



Figure 7: Alternative 4A



4.4 Predictive Crash Modeling Update

In December 2017, the NCDOT Traffic Mobility and Safety Branch completed a Predictive Crash Modeling Study for the proposed four build alternatives. Results of the study showed that the highest concentration of crashes correlate to the location of the horizontal and vertical curves with design speeds < 35 mph. The purpose of the Predictive Crash study was to determine the predicted number of crashes in 2035 and the predicted reduction in crash frequency based off the improvements proposed for each alternative. The findings from the study are summarized in Table 2.

Key Findings

- Alternative 1 resulted in the highest predicted reduction in crashes (74%) in 2035. This is a result of the combination of pavement widening and the higher design standards, compared to the other alternatives.
- Alternative 4A performed similarly to Alternative 1, resulting in the second highest predicted reduction in crashes (68%) in 2035. The predicted reduction is not as high as Alternative 1 due to the slightly decreased design standards. Alternative 4A does address the key design elements along the corridor that contribute to the high number of crashes.
- Alternative 2-Revised is expected to result in a 67% reduction in crashes in 2035. Sections of Alternative 2-Revised where the existing alignment are improved, correspond with sections of NC 143 that have the highest concentration of crashes. The improvements along these sections



also utilize the same design standards as Alternative 4A; thus, the similar predicted crash reduction to Alternative 4A. However, this alternative does not address the high crash locations between Buchanan Branch Road and I U Gap Road.

- Alternative 4 is expected to result in a 31% reduction in crashes in 2035. This was the lowest predicted crash reduction of all build alternatives. The widened pavement did play a role in the overall reduction in predicted crashes but does not provide enough of an improvement to address the high percentage of lane departure crashes.

4.5 Build Alternatives Summary

Table 2 provides a comparison of the alternatives considered, summarizing the percentage of deficiencies improved by each alternative, the crashes predicted in the design years, and the predicted crash reduction in the design year. Tables 2A and 2B in Appendix A provide a detailed summary of all horizontal and vertical curves with a design speed below 35 mph.

Table 2: Alternative Summary

Alternative	Pavement Widened to > 11-foot lanes w/ 6-foot shoulders	% of Horizontal Curves w/Design Speed < 35 mph Improved	% of Vertical Curves w/Design Speed < 35 mph Improved	Predicted Crashes Per Year (2035)	Predicted Reduction Crash Frequency as Compared with the No Build Option
No Build	X	0%	0%	29	---
Alternative Modes of Transportation	X	0%	0%	---	---
Alternative 1 Improve Existing Alignment to 45-mph	✓	100%	100%	8	-74%
Alternative 2 – Revised* Improve Existing Alignment to 35-mph, Partial New Location	✓	100%	100%	10	-67%
Alternative 4 Shoulder widening only	✓	0%	0%	20	-31%
Alternative 4A Improve Existing Alignment to 35-mph	✓	100%	100%	9	-68%

Key Findings

- The No-Build and Alternatives Modes of Transportation alternatives do not address any of the deficiencies along the project corridor. **It is recommended that the No-build and Alternative Modes of Transportation alternatives not be carried forward for detailed study.**
- Alternative 4 widens the pavement to accommodate 11-foot lanes and 6-foot shoulders in each direction, which is consistent with the recommendations for a Rural Collector. However, it does not improve any of the horizontal or vertical curves that have design speeds below what is recommended for Rural Collectors. **It is recommended that Alternative 4 not be carried forward for detailed study.**
- Alternatives 1, 2-Revised, and 4A widen the pavement to accommodate 11-foot lanes and 6-foot shoulders in each direction and upgrades substandard vertical and horizontal curves. **It is recommended that Alternatives 1, 2-Revised, and 4A be carried forward for detailed study.**



5.0 Environmental Considerations

5.1 Natural Resources

The project corridor lies within the Little Tennessee River basin. The streams in the project study area have been designated as cold-water streams for the purposes of stream mitigation.

Stream and Wetlands

- Santeetlah Lake, West Buffalo Creek, and Snowbird Creek are classified as Wild Trout Waters.
- Snowbird Creek is classified as a Hatchery-supported Trout Stream.

Table 3: Jurisdictional Resources

Stream	Best Usage Category	Benthic Bioclassification
Barker Branch	C	No Classification
Hooper Branch	C	No Classification
Long Hungry Branch	C	No Classification
Snowbird Creek	C:Tr	Excellent
West Buffalo Creek arm of Santeetlah Lake	B: Tr	No Classification

Table 4 summarizes the impacts to jurisdictional features by alternative. See Tables 4A and 4B in Appendix A for detailed impact quantities for each jurisdictional feature.

Table 4: Jurisdictional Impacts (slope stakes plus 25-feet)

Resource	Alternative 1	Alternative 2-Revised	Alternative 4
Streams (linear feet)	4,280	540	3,300
Wetlands (acres)	0.1	0.08	0.08
Ponds (acres)	0.4	0	0.4

Table 5: Federally-Protected Species

Scientific Name	Common Name	Status
<i>Alasmidonta raveneliana</i>	Appalachian Elktoe	E
<i>Clemmys muhlenbergii</i>	Bog turtle	T(S/A)
<i>Glaucomys sabrinus coloratus</i>	Carolina northern flying squirrel	E
<i>Myotis grisescens</i>	Gray Bat	E
<i>Myotis spetentrionalis</i>	Northern long-eared bat	T
<i>Myotis sodalist</i>	Indiana bat	E
<i>Gymnoderma lineare</i>	Rock gnome lichen	E
<i>Bombus affinis</i>	Rusty-patched bumble bee	E
<i>Erimonax monachus</i>	Spotfin chub (turquoise shiner)	T
<i>Spiraea virginiana</i>	Virginia spiraea	T
* <i>Haliaeetus leucocephalus</i>	Bald eagle	BGPA

5.2 Cultural and Community Resources

Archaeological Resources

Archaeological Sites

Previous archaeological studies identified eight sites within the APE:

- 31GH207, 31GH221, 31GH223, 31GH225-31GH227, 31GH448, and 31GH458
- Field surveys identified four new archaeological sites within the APE:



- 31GH619, 31GH620, 316GH21, and 31GH622.
- Site 31GH227 is recommended as eligible for listing on the National Register of Historic Places.
 - Site 31GH227 is described as a multicomponent site with dense concentrations of Middle and Late Archaic artifact deposits in an undisturbed context. Eligible for listing in the NRHP under criterion D.

Cemeteries

There are three known cemeteries within 600 feet of the project's APE:

- Carver Cemetery: located approximately 500 feet northeast of the APE along Forest Service Road 2856.
- Chickalee Cemetery: located atop a small knoll west of NC 143, approximately 800 feet north of the intersection of NC 143 and SR 1125 (Buchanan Branch Road).
- Buffalo Independent Baptist Church: located at the NC 143 Business intersection
- An interment site was identified on the Eastern Band of the Cherokee Indian (ECBI) Tract # 373.
- These cemeteries are not considered eligible for listing on the National Register.

Architectural/Historic Resources

There are no architectural resources eligible for listing in the NRHP in the APE.

Tribal Lands and Resources

Tribal Tracts

- Tract 17 (Elowah tract)
- Tract 93 (Cooloska tract)
- Tract 373 (Ootalkanah tract)
- Tract 477 (Towayallah tract)

Traditional Cultural Resources (TCR)

The following resources have been identified as potential TCRs.

- Indian Springs Cultural Washing Site (GH 0087, Property #17)
- Origin of the Snowbird Legend Site (GH 088, Property #18)
- Chickalee Cemetery (GH 0089, Property #19)

Tribal Coordination

No tribal coordination has occurred since the project was reinitiated in early 2017. Stakeholder meetings will resume in Spring 2018, after approval of preliminary designs to be carried forward.

US Forest Service Resources

The project is located almost entirely within the Nantahala National Forest. In addition to the national forest, there are individual USFS resources that are located within the project study area.

- Santeetlah Road Wayside Access to West Buffalo Creek
- The Santeetlah Lake Bike Trail
- Long Hungry Road Camping Area
- Snowbird Picnic Area

Community Resources

- Thunder Mountain General Store and Deli
- Thunder Mountain Cabin
- Buffalo Baptist Church
- New Hope Baptist Church
- Graham County Trash Disposal Site





Cherohala Skyway

- Connects Robbinsville to Tellico Pines, TN. Begins at Santeetlah Gap, west of the project study area.
- Designated a Scenic Byway in 1997.

Table 6: Cultural and Community Resources Impacts

Resource	Alternative 1	Alternative 2 Revised	Alternative 4A
Tribal Resources			
Towayallah Tract (acres)	0	0.7	0.7
Ootalkahah Tract (acres)	2.1	0	3.3
Elawah Tract (acres)	4.4	6.2	6.2
Collooska Tract (acres)	0.3	1.1	1.1
Total	6.8	8.0	11.3
Indian Springs Cultural Washing Site	N	N	N
Origin of Snow Bird Legend Site	N	N	N
Chickalelee Cemetery	N	N	Y
Other Archaeological Sites Impacts	Y	Y	Y
Tribal lands	3.8	3.4	3.4
Community Resources			
Residential Relocations (Estimated)	1	4	4
Business Relocations (Estimated)	2	1	2
Churches Relocations (Estimated)	0	0	0
Hazardous Material or UST/AST Sites	1	0	1
Impacts Waste Convenience Site	N	Y	N
US Forest Service Resources			
Property Impacts (acres)	57.9	45.7	61.1
Santeetlah Bike Trail (linear feet)	1,180	750	520
Long Hungry Road Camping Area	N	N	N
Snowbird Picnic Area	Y	N	Y

5.3 Other Coordination

Brookfield Renewables Smoky Mountain Hydropower

- Shoreline Management Plan approved by the Federal Energy Regulatory Commission (FERC) in 2016, with limited changes.
- The Project Boundary follows the shoreline of Santeetlah Lake but also extends approximately 3,500 feet beyond NC 143 along West Buffalo Creek and along Snowbird Creek to NC 143.

Tennessee Valley Authority (TVA)

- Section 26a of the TVA requires TVA approval before any construction activities can occur along TVA regulated reservoirs or in the Tennessee River or its tributaries.



5.4 Drainage Structures

Two bridges and one culvert are located along NC 143 within the project study area. Table 7 provides detailed information on each of the hydraulic structures.

Table 7: Existing Hydraulic Structures

Bridge Number	Waterway Crossed	Year Constructed	Structure Length (ft)	Clear Roadway Width (ft)	Sufficiency Rating	Alternative
131	W. Buffalo Creek	1971	320	29.5	91.33	1, 2-Revised, and 4A
13	Snowbird Creek	1982	180	25	63.83	1 and 4A
N/A	Hooper Branch			48-in diameter	N/A	1 and 4A

5.5 Waste Material

It is anticipated that Alternatives 1, 2-Revised, and 4A will not result in a net gain of waste materials.

5.6 Recent Stakeholder Involvement Summary

NCDOT Division 14 staff met with local stakeholders in January 2017.

- Graham County Commissioners passed a resolution stating their support for improving existing alignment.
- Connects Robbinsville to Tellico Pines, TN. Begins at Santeetlah Gap, west of the Graham County Commissioners also passed a resolution designating the project corridor as a bike route.

Additional stakeholder outreach and public involvement will be conducted prior to the CP 3/4A Meeting.



6.0 Impact Summary

Table 8: Alternative Impact Summary

Resource	Alternative 1	Alternative 2 Revised	Alternative 4A
Streams (linear feet)*	4,280	2,250	3,300
Wetlands (acres)*	0.55	0.08	0.08
Ponds (acres)	0.4	-	0.4
Cultural Resources			
Towayallah Tract (acres)	0	0.7	0.7
Ootakahah Tract (acres)	2.1	0	3.3
Elowah Tract (acres)	4.4	6.2	6.2
Collooska Tract (acres)	0.3	1.1	1.1
Total	6.8	8.0	11.3
Indian Springs Cultural Washing Site	N	N	N
Origin of Snow Bird Legend Site	N	N	N
Chickalee Cemetery	N	N	Y
Other Archaeological Sites Impacts	Y	Y	Y
National Forest Lands	57.87	45.76	61.06
Tribal lands	3.8	3.4	3.4
Burial Site	0	0	0
US Forest Service Resources	1	0	1
Other Cemeteries	0	0	0
Community Resources			
Residential Relocations (Estimated)	1	4	4
Business Relocations (Estimated)	2	1	2
Churches	0	0	0
Hazardous Material Sites	1	0	0
NR- Eligible	0	0	0
US Forest Service Resources			
Property Impacts (acres)	57.9	45.7	61.1
Santeetlah Bike Trail (linear feet)	1,183	745	524
Long Hungry Road Camping Area	N	N	N
Snowbird Picnic Area	Y	N	Y
Other Information			

*See Tables 4A and 4B for a detailed breakout of individual stream and wetland impacts.



7.0 Alignment Review and Bridging Decisions (Concurrence Point 2A)

7.1 Alignment Review

Context Sensitive Solutions

As previously noted, the Performance Measures include the consideration and implementation of the applicable of CSS Design Controls and Criteria.

- Design Flexibility and Exceptions:
 - ✓ Encourages highway designers to expand their consideration in applying the Green Book criteria.
 - ✓ A design exception is a documented decision to design a highway element or segment of highway to a design criterion or value that does not meet the minimum value that has been established for that highway or project.
- Road Classification
 - ✓ A design process integrating the principles of CSS emphasizes that as context changes, thoroughfare design should also change to support the activity generated by the context.
- Safety
 - ✓ Safety practitioners are encouraged to consider this set of countermeasures that are research-proven, but not widely applied on a national basis.

Additional design studies will be implemented to determine how these Design Controls and Criteria and be applied to the current alternatives to assist in the modification of the proposed alignments, implement safety countermeasures, identify retaining wall locations, while still meeting the project purpose and need while preserving the scenic, aesthetic, and cultural resources along the project corridor.

7.2 Bridging Decisions

Four major stream crossings are including in the build alternative:

- Crossing Site # 1: West Buffalo Creek (Santeetlah Lake): Existing Bridge No. 131



Looking west



Looking east along NC 143



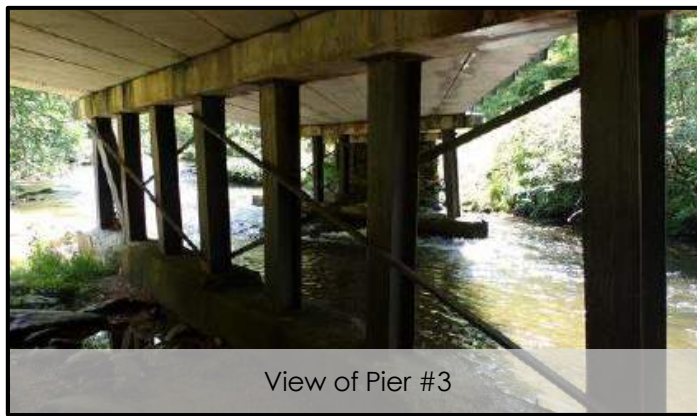
- Crossing Site #2: Snowbird Creek – Existing Bridge No. 13



Looking west along NC 143



Looking south upstream



View of Pier #3

- Crossing Site #3: Hooper Branch – Existing 48-inch concrete masonry pipe



Looking north (Outlet End)



Looking south (Inlet End)



- Crossing Site #4: Snowbird Creek (Santeetlah Lake) – Alternative 2

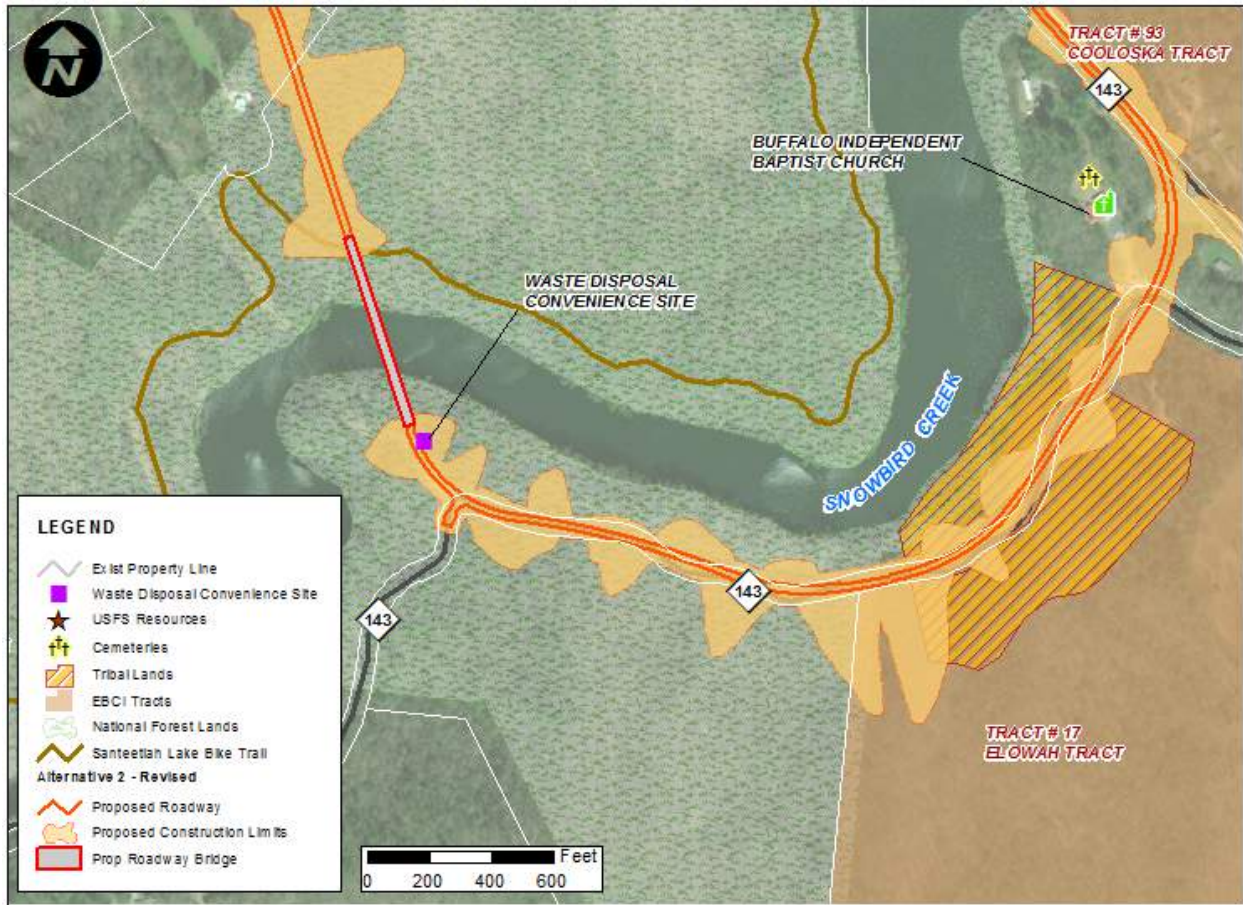


Table 9 summarizes the proposed bridging recommendations for the proposed alternatives.

Table 9: Existing Hydraulic Structures

Crossing Number	Stream Crossing	Alternative 1	Alternative 2-Revised	Alternative 4A
1	West Buffalo Creek (Santeetlah Lake)	Retain Bridge #131, and guardrail to all four corners of the bridge	Retain Bridge #131, and guardrail to all four corners of the bridge	Retain Bridge #131, and guardrail to all four corners of the bridge
2	Snowbird Creek	Retain Bridge #13, add guard rail to all four corners of the bridge	N/A- New location align is proposed for this project segment	Retain Bridge #13, add guard rail to all four corners of the bridge
3	Hooper Branch	Realign NC 143, remove existing 48-inch CMP, daylight approximately 5-feet of stream, construct 8'x8' (60-long) RCBC Impact: 150-feet	N/A- New location align is proposed for this project segment	Realign NC 143, remove existing 48-inch CMP, daylight approximately 5-feet of stream, construct 8'x8' (60-0ing) RCBC Impact: 150-feet
4	Snowbird Creek (Santeetlah Lake)	N/A – No crossing proposed for this location	640-foot long bridge	N/A – No crossing proposed for this location



Initial studies evaluated the possibility of replacing the 48-inch CMP at Hooper Branch with a bridge instead of an 8-foot x 8-foot RCBC. The following reasons for not constructing a bridge at the site were noted in the previous Concurrence Point 2A packet:

- Relatively small drainage area (672 acres)
- Relatively low flow rate (3 cubic feet per second)
- NC 143 crosses Hooper Branch in a curve. Alternatives 1 and 4A would include a curved alignment at the creek crossing, requiring superelevation.
 - A super elevated structure at this location would pose a safety concern due to potential icing.
 - To minimize superelevation, NC 143 would need to be realigned south into a hillside and require the realignment of the SR 1118 intersection, resulting in more property impacts.

Table 10 Jurisdictional Resources: Additional Information for streams being crossed

	West Buffalo Creek	Snowbird Creek	Hooper Branch
DWQ Index Number	2-190-12	2-190-9-(15.5)	2-190-9-(15.5)
Best Usage Classification	C; Tr	C; Tr	C; Tr
Bank Height (ft)	15	+	0.5
Bankfull Height (ft)	200	71	3
Water Depth (in)	120	36	2 – 3
Channel Substrate	Silt	Boulder, Cobble	Cobble, Gravel
Velocity	Moderate	Moderate	Moderate
Clarity	Clear	Clear	Clear
Classification	Perennial	Perennial	Perennial
River Basin Buffer Rules	Not Subject	Not Subject	Not Subject

NEPA/404 MERGER TEAM MEETING AGREEMENT

Concurrence Point No. 2: Design Options for Detailed Study

PROJECT NO./TIP NO./ NAME/DESCRIPTION:

WBS Element: 34508.1.1

TIP Project Number: R-2822B

TIP Description: NC 143 Improvements, from West Buffalo Creek to NC 143 Business west of Robbinsville.

The Project Team concurred on this date of March 22, 2018, that the following alternatives be carried forward for detailed study.

- **Alternative 1:** Widen the existing roadway to consist of two 11-foot wide travel lanes with 6-foot wide shoulders (4-foot paved). The alternative includes substantial horizontal and vertical alignment improvements from West Buffalo Creek to just north of NC 143 Business. The alternative has a design speed of 45-mph and includes realignment of the NC 143 intersection with NC 143 Business near the eastern project terminus.

- **Alternative 2 Revised:** Widen the existing roadway to consist of two 11-foot wide travel lanes and 6-foot wide shoulders (4-foot paved). The alternative includes horizontal and vertical alignment improvements from West Buffalo Creek to the Carver Cemetery and from near the waste disposal site to NC 143 Business. From the Carver Cemetery to near the waste disposal site, NC 143 will follow a new alignment (north and east of existing NC 143), which includes a new bridge over Snowbird Creek (Santeetlah Lake). The alternative has a minimum design speed of 35 mph and includes realignment of the NC 143 intersection with NC 143 Business near the eastern project terminus.

- **Alternative 4 (Transportation System Management Alternative):** Widen the existing roadway to consist of two 11-foot wide travel lanes with 6-foot wide shoulders (4-foot paved) from West Buffalo Creek to just north of NC 143 Business. The alternative does not include any changes to the vertical or horizontal alignment. The alternative includes realignment of the NC 143 intersection with NC 143 Business near the eastern project terminus.

- **Alternative 4A:** Widen the existing roadway to consist of two 11-foot wide travel lanes and 6-foot wide shoulders (4-foot paved). The alternative includes horizontal and vertical alignment improvements from West Buffalo Creek to just north of NC 143 Business. The alternative has a minimum design speed of 35-mph and includes realignment of the NC 143 intersection with NC 143 Business near the eastern project terminus.

USACE	_____	_____	NCDWR	_____	_____
	Crystal Amschler	Date		Kevin Barnett	Date
USFWS	_____	_____	NCWRC	_____	_____
	Marella Buncick	Date		Marla Chambers	Date
USFS	_____	_____	SHPO	_____	_____
	Angie Gee	Date		Renee Gledhill-Earley	Date
ECBI THPO	_____	_____	TVA	_____	_____
	Stephen Yerka	Date		Ashley Farless	Date
UKB THPO	_____	_____	USEPA	_____	_____
	Karen Pritchett	Date		Chris Militscher	Date
Cherokee Nation	_____	_____	NCDOT	_____	_____
	Elizabeth Toombs	Date		Wanda Austin	Date

NEPA/404 MERGER TEAM MEETING AGREEMENT

Concurrence Point No. 2A: Alignment Review and Bridging Decisions

PROJECT NO./TIP NO./ NAME/DESCRIPTION:

WBS Element: 34508.1.1

TIP Project Number: R-2822B

TIP Description: NC 143 Improvements, from West Buffalo Creek to NC 143 Business west of Robbinsville.

The Project Team concurred on this date of March 22, 2018, and reached concurrence on bridging decisions for the proposed NC 143 improvements.

Crossing Number	Stream Crossing	Alternative 1	Alternative 2-Revised	Alternative 4A
1	West Buffalo Creek (Santeetlah Lake)	Retain Bridge #131, and guardrail to all four corners of the bridge	Retain Bridge #131, and guardrail to all four corners of the bridge	Retain Bridge #131, and guardrail to all four corners of the bridge
2	Snowbird Creek	Retain Bridge #13, add guard rail to all four corners of the bridge	N/A- New location align is proposed for this project segment	Retain Bridge #13, add guard rail to all four corners of the bridge
3	Hooper Branch	Realign NC 143, remove existing 48-inch CMP, daylight approximately 5-feet of stream, construct 8'x8' (60-ling) RCBC	N/A- New location align is proposed for this project segment	Realign NC 143, remove existing 48-inch CMP, daylight approximately 5-feet of stream, construct 8'x8' (60-ling) RCBC
4	Snowbird Creek (Santeetlah Lake)	N/A – No crossing proposed for this location	640-foot long bridge	N/A – No crossing proposed for this location

USACE	_____	_____	NCDWR	_____	_____
	Crystal Amschler	Date		Kevin Barnett	Date

USFWS	_____	_____	NCWRC	_____	_____
	Marella Buncick	Date		Marla Chambers	Date

USFS	_____	_____	SHPO	_____	_____
	Angie Gee	Date		Renee Gledhill-Earley	Date

ECBI THPO	_____	_____	TVA	_____	_____
	Stephen Yerka	Date		Ashley Farless	Date

UKB THPO	_____	_____	USEPA	_____	_____
	Karen Pritchett	Date		Chris Militscher	Date

Cherokee Nation	_____	_____	NCDOT	_____	_____
	Elizabeth Toombs	Date		Wanda Austin	Date

APPENDIX

Table 2A: Horizontal Curve Summary (Design Speed < 35 mph)

Existing curves do not meet 35 mph Design Speed			Does this alternate improve the curve at this location to a minimum 35mph design speed?			
Curve	Station #	Design Speed	Alternative 1	Alternative 2-Revised	Alternative 4	Alternative 4A
1	36+81.56	30mph	Y	Y	N	Y
2	38+22.32	20mph	Y	Y	N	Y
3	40+10.00	30mph	Y	Y	N	Y
4	48+15.00	25mph	Y	Y	N	Y
5	54+00.00	30mph	Y	Y	N	Y
6	59+00.00	25mph	Y	Y	N	Y
7	63+00.00	25mph	Y	Y	N	Y
8	65+00.00	30mph	Y	Y	N	Y
9	67+00.00	30mph	Y	Y	N	Y
10	68+00.00	20mph	Y	Y	N	Y
11	71+00.00	20mph	Y	Y	N	Y
12	74+00.00	25mph	Y	Y	N	Y
13	79+00.00	25mph	Y	Y	N	Y
14	81+00.00	15mph	Y	Y	N	Y
15	82+00.00	25mph	Y	Y	N	Y
16	87+00.00	20mph	Y	Y	N	Y
17	89+00.00	20mph	Y	Y	N	Y
18	91+00.00	25mph	Y	Y	N	Y
19	93+00.00	20mph	Y	Y	N	Y
20	95+00.00	25mph	Y	Y	N	Y
21	97+00.00	30mph	Y	Y	N	Y
22	99+00.00	25mph	Y	Y	N	Y
23	106+00.00	30mph	Y	Y	N	Y
24	107+00.00	30mph	Y	Y	N	Y
25	111+00.00	30mph	Y	Y	N	Y
26	113+00.00	20mph	Y	Y	N	Y
27	115+00.00	25mph	Y	Y	N	Y
28	116+00.00	15mph	Y	Y	N	Y
29	117+00.00	20mph	Y	Y	N	Y
30	121+00.00	25mph	Y	Y	N	Y
31	131+00.00	30mph	Y	Y	N	Y
32	132+00.00	25mph	Y	Y	N	Y
33	138+00.00	30mph	Y	Y	N	Y
34	170+00.00	30mph	Y	Y	N	Y
35	171+00.00	25mph	Y	Y	N	Y
36	175+00.00	30mph	Y	Y	N	Y
37	180+00.00	20mph	Y	Y	N	Y
38	186+00.00	30mph	Y	Y	N	Y
39	199+00.00	25mph	Y	Y	N	Y
40	201+00.00	25mph	Y	Y	N	Y

Table 2A (cont.): Horizontal Curve Summary (Design Speed < 35 mph)

Existing curves do not meet 35 mph Design Speed			Does this alternate improve the curve at this location to a minimum 35mph design speed?			
Curve	Station #	Design Speed	Alternative 1	Alternative 2-Revised	Alternative 4	Alternative 4A
41	202+00.00	30mph	Y	Y	N	Y
42	214+00.00	30mph	Y	Y	N	Y
43	217+00.00	20mph	Y	Y	N	Y
44	218+00.00	15mph	Y	Y	N	Y
45	224+00.00	25mph	Y	Y	N	Y
46	226+00.00	25mph	Y	Y	N	Y
47	228+00.00	30mph	Y	Y	N	Y
48	229+00.00	25mph	Y	Y	N	Y
49	235+00.00	30mph	Y	Y	N	Y
50	238+00.00	25mph	Y	Y	N	Y
51	241+00.00	25mph	Y	Y	N	Y
52	243+00.00	20mph	Y	Y	N	Y
53	246+00.00	20mph	Y	Y	N	Y
% of Deficient Curves improved to design speed ≥ 35 mph			100%	100%	0%	100%

Table 2B: Vertical Curve (Design Speed < 35 mph) Summary

Existing curves do not meet 35 mph Design Speed			Does this alternate improve the curve at this location to meet 35mph?			
Curve	Station #	Design Speed	Alternative 1	Alternative 2-Revised	Alternative 4	Alternative 4A
1	59+00.00	20 mph	Y	Y	N	Y
2	100+00.00	25 mph	Y	Y	N	Y
3	117+00.00	20 mph	Y	Y	N	Y
4	120+00.00	20 mph	Y	Y	N	Y
5	202+00.00	25 mph	Y	Y	N	Y
6	246+00.00	25 mph	Y	Y	N	Y
% of Deficient Curves improved to design speed ≥ 35 mph			100%	100%	0%	100%

Table 3A: Jurisdictional Resources: Additional Information

Stream Name	DWQ Index Number	Best Usage Classification	Bank Height (ft)	Bankfull Width (ft)	Water Depth (in)	Channel Substrate	Velocity	Clarity	Classification	River Basin Buffer Rules
West Buffalo Creek (Santeetlah Lake)	2-190-12	C; Tr	15	200	120	Silt	Moderate	Clear	Perennial	Not Subject
Snowbird Creek	2-190-9-(15.5)	C; Tr	6	71	36	Boulder, Cobble	Moderate	Clear	Perennial	Not Subject
Hooper Branch	2-190-9-(15.5)	C; Tr	0.5	3	2 – 3	Cobble, Gravel	Moderate	Clear	Perennial	Not Subject

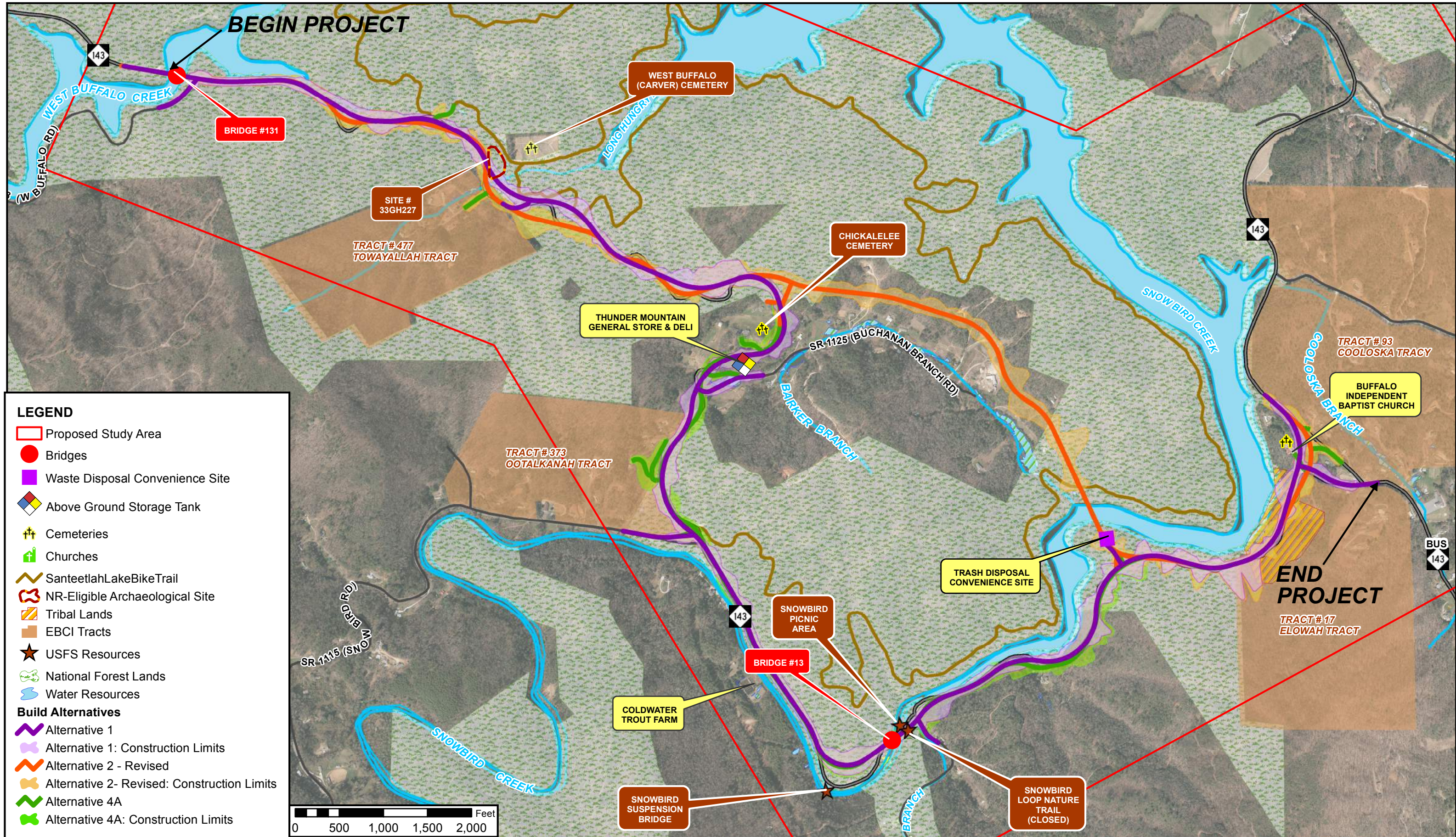
Crossing Number	Stream Crossing	Alternative 1	Alternative 2-Revised	Alternative 4A
1	West Buffalo Creek (Santeetlah Lake)	Retain Bridge #131, and guardrail to all four corners of the bridge	Retain Bridge #131, and guardrail to all four corners of the bridge	Retain Bridge #131, and guardrail to all four corners of the bridge
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4	Snowbird Creek (Santeetlah Lake)	N/A – No crossing proposed for this location	640-foot long bridge	N/A – No crossing proposed for this location

Table 4A: Stream Impact Summary

Stream Crossing	Alternative 1	Alternative 2- Revised	Alternative 4A
11SA	252.96	282.40	282.4
1SBC	109.83	0	158.76
1SA	605.91	171.68	171.68
1SAA	79.68	199.94	199.94
1SAB	53.39	66.74	66.74
2SA	182.25	97.04	97.04
2SAC	44.14	0	0
2SAD	118.69	0	0
3SA	0	70.61	70.61
3SB	295.12	150.48	150.48
3SG	0		396.46
3SCG	35.11	35.11	35.11
3SCH	38.96	38.96	38.96
3SD	48.64	45.60	45.6
4SAA	0	240.22	0
5SA	0	0	59.42
5SB	0	0	151.89
5SG	0	0	269.87
5SA	0	0	11.06
6SA	47.13	0	44.13
6SB	45.21	0	45.64
7SD	158.51	0	250.56
8SABB	0	0	91.09
8SB	145.81	0	113.93
BB	0	53.6	0
4PA	422.00	0	0
1SAAA	19.53	0	0
1SAAB	1.40	0	0
4WY	0	0	144.94
12SAA	0	0	0
3ADA	341.92	0	0
3SC	413.21	396.46	0
5SAB	57.05	0	0
8SA	96.00	0	0
4SA	354.82	0	0
BB	310.46	400.96	400.96
Total Stream Impacts by Alternative (LF)	4,280	2,250	3,300

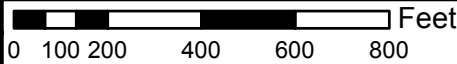
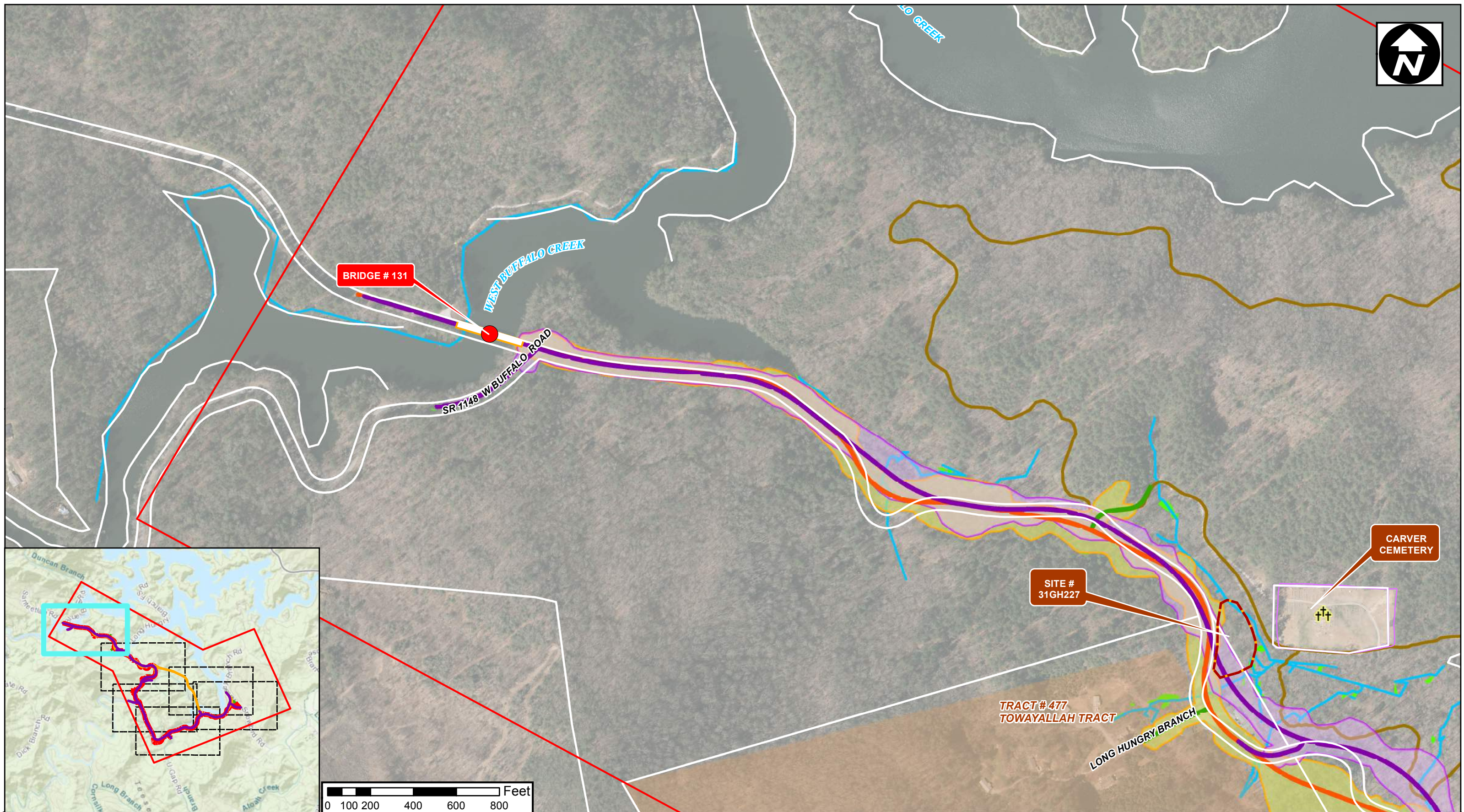
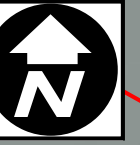
Table 4B: Wetland Impact Summary

Wetland Number	Alternative 1	Alternative 2- Revised	Alternative 4A
2WG	0.02	0.02	0.02
9WA	0	0.06	0
7WA	0	0	0.01
4WW	0.09	0	0.05
1WB	0.003	0.003	0.003
Total Wetlands Impacts by Alternative (Acres)	0.1	0.1	0.1



NC 143 Improvements
From West Buffalo Creek to NC 143 Business in Graham County
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EXHIBIT 1: ENVIRONMENTAL FEATURES

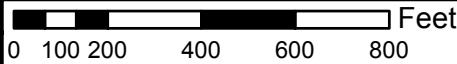
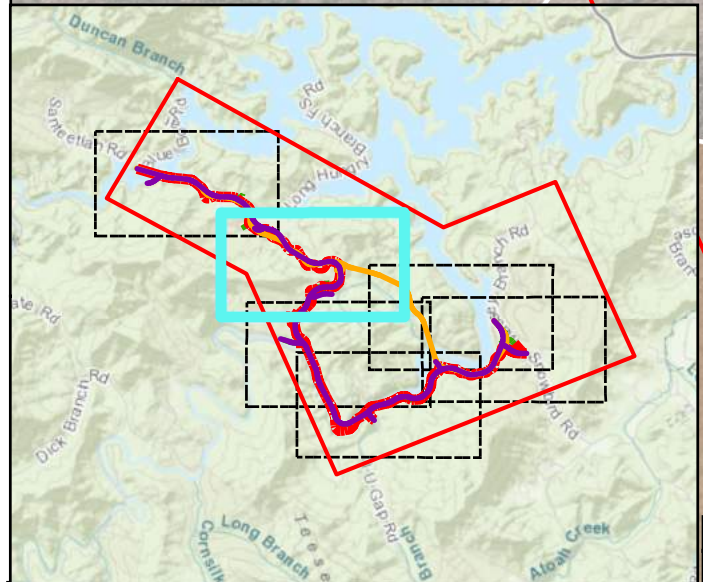
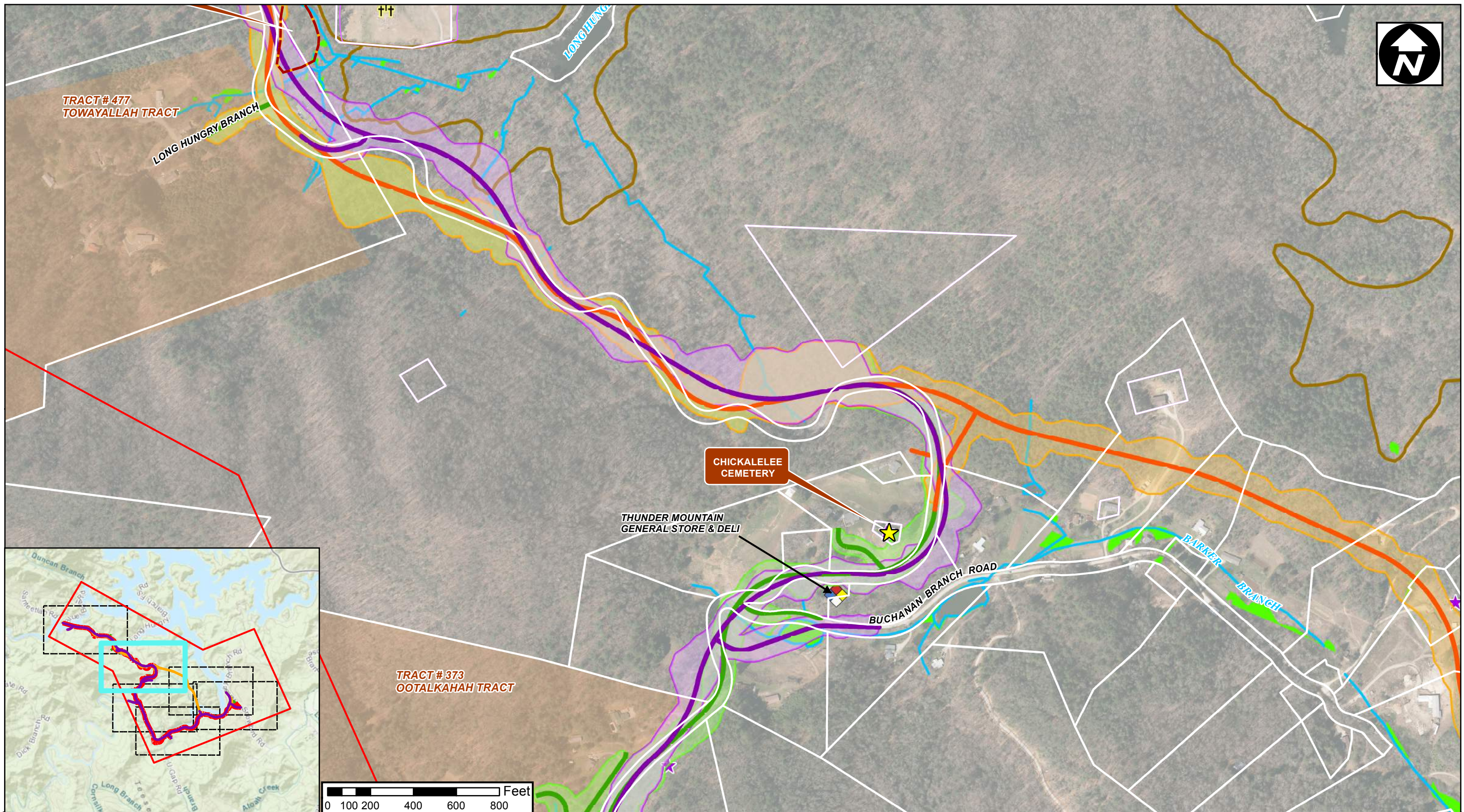


Existing Bridges	Waste Disposal Convenience Site	Traditional Cultural Properties	Alternative 1 Prop Alignment
Proposed Study Area	Above Ground Storage Tank	Cemeteries	Alternative 1 Construction Limits
Exist Property Line	US Forest Service Lands	Churches	Alternative 2-Revised Proposed Alignment
Exist Hydro Jurisdictional Stream	USFS Resources	EBCI Tracts	Alternative 2-Revised Construction Limits
Exist Environmental Wetland Boundary	Santeetlah Lake Bike Trail	Tribal Lands	Alternative 4A Proposed Alignment
		NR-Eligible Archaeological Site	Alternative 4A Construction Limits

**NC 143 Improvements
From West Buffalo Creek to
NC 143 Business in Graham County
TIP R-2822B**

EXHIBIT 2: BUILD ALTERNATIVES

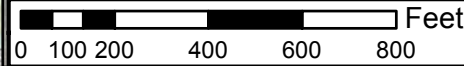
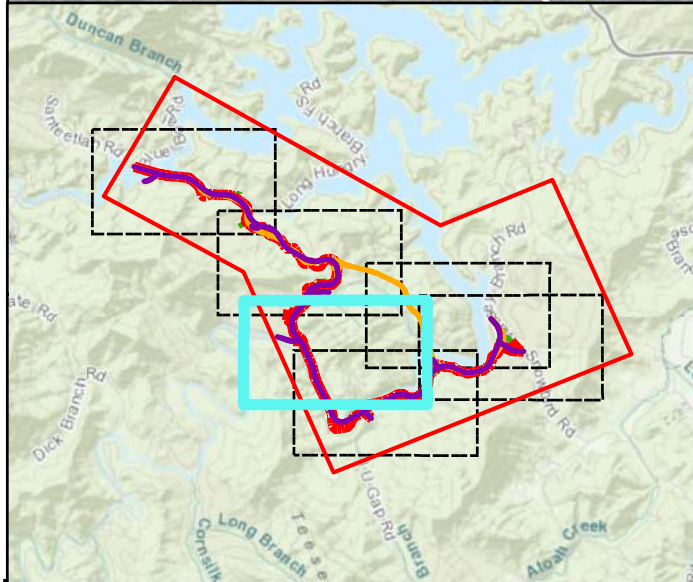
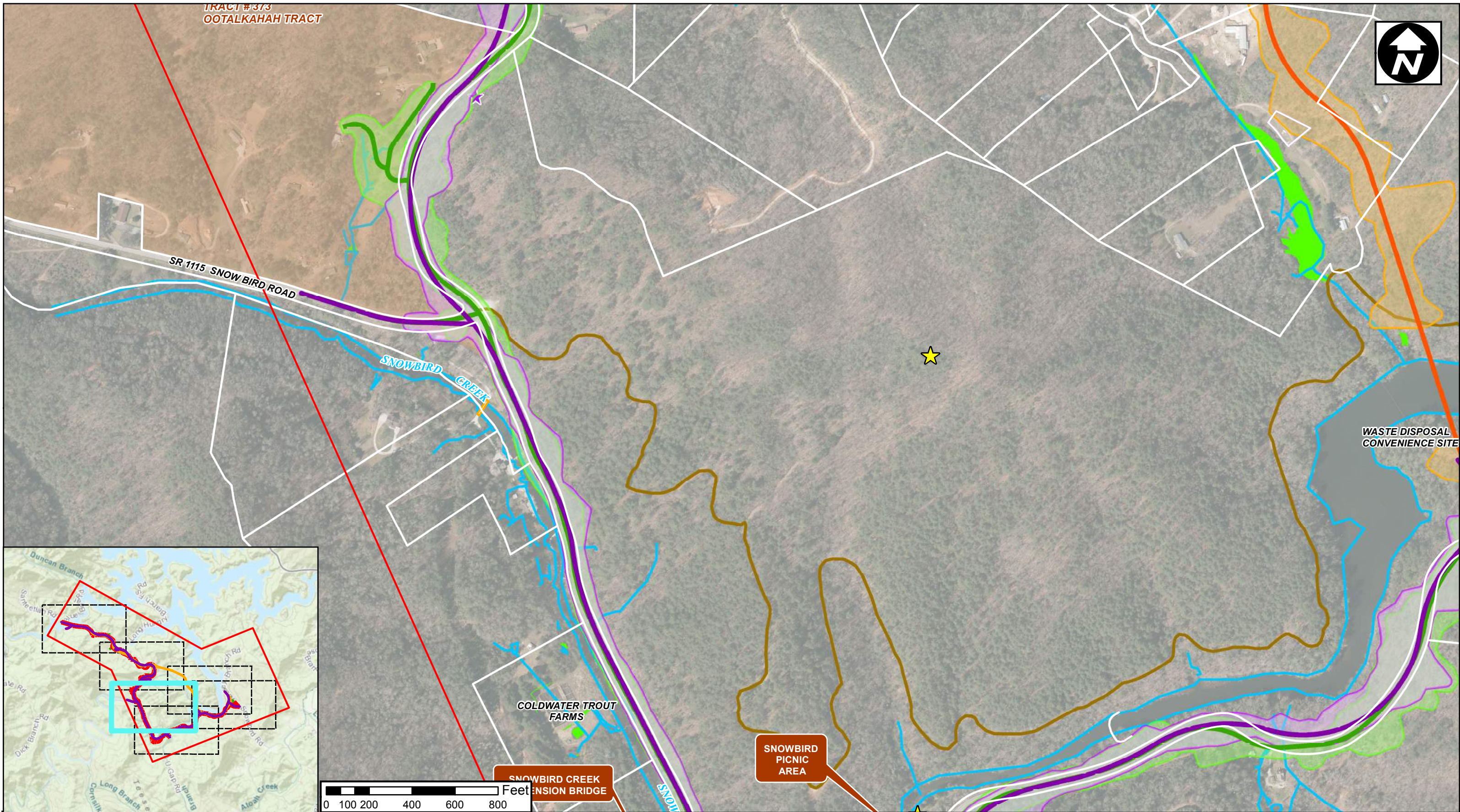
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Existing Bridges	Waste Disposal Convenience Site	Traditional Cultural Properties	Alternative 1 Prop Alignment
Proposed Study Area	Above Ground Storage Tank	Cemeteries	Alternative 1 Construction Limits
Exist Property Line	US Forest Service Lands	Churches	Alternative 2-Revised Proposed Alignment
Exist Hydro Jurisdictional Stream	USFS Resources	EBCI Tracts	Alternative 2-Revised Construction Limits
Exist Environmental Wetland Boundary	Santeetlah Lake Bike Trail	Tribal Lands	Alternative 4A Proposed Alignment
		NR-Eligible Archaeological Site	Alternative 4A Construction Limits

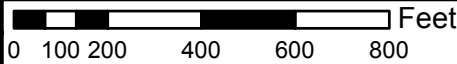
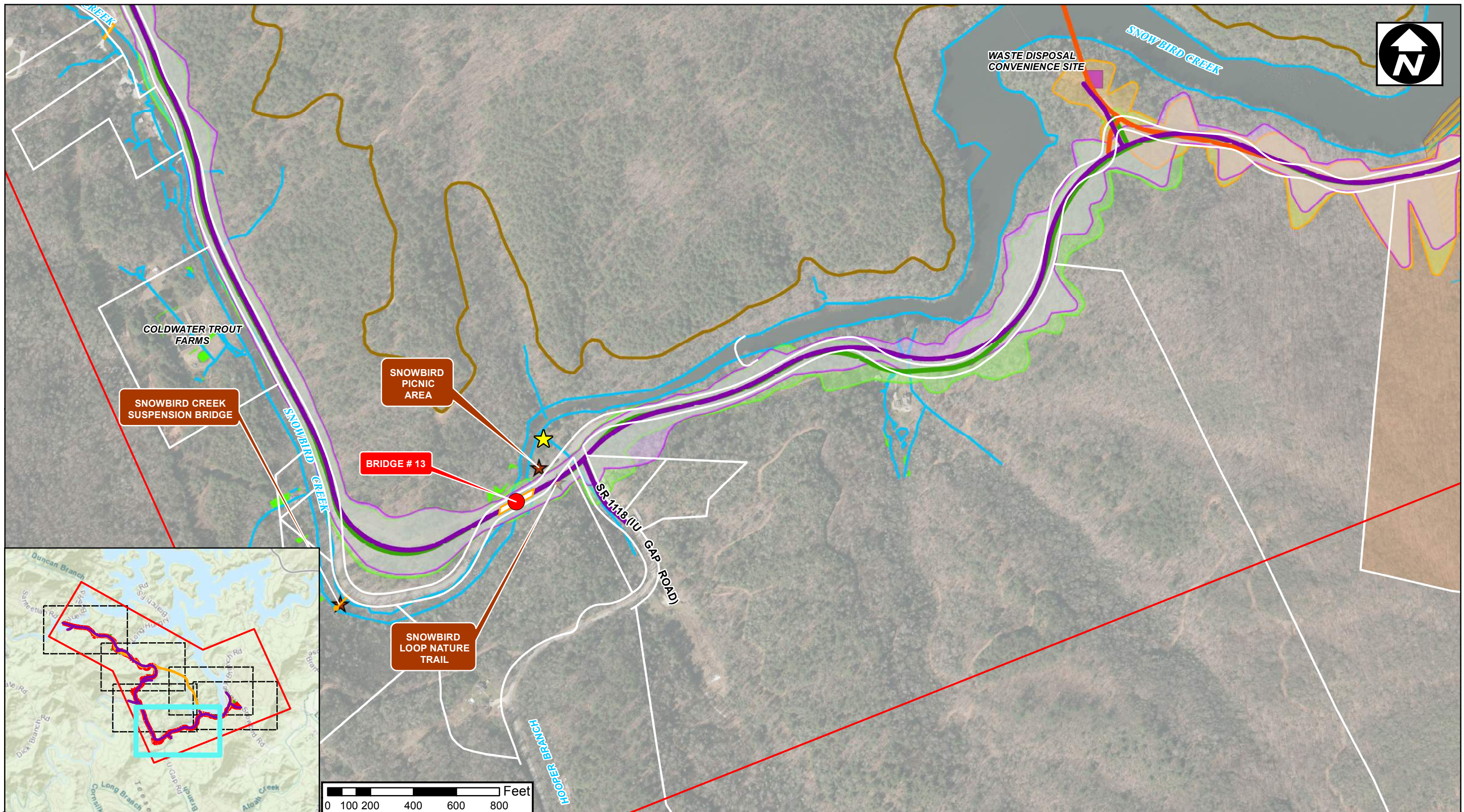
**NC 143 Improvements
From West Buffalo Creek to
NC 143 Business in Graham County
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TRACT #373
OOTALKAHAH TRACT



	Existing Bridges		Waste Disposal Convenience Site		Traditional Cultural Properties		Alternative 1 Prop Alignment
	Proposed Study Area		Above Ground Storage Tank		Cemeteries		Alternative 1 Construction Limits
	Exist Property Line		US Forest Service Lands		Churches		Alternative 2-Revised Proposed Alignment
	Exist Hydro Jurisdictional Stream		EBCI Tracts		Tribal Lands		Alternative 2-Revised Construction Limits
	Exist Environmental Wetland Boundary		USFS Resources		NR-Eligible Archaeological Site		Alternative 4A Proposed Alignment
			Santeetlah Lake Bike Trail				Alternative 4A Construction Limits

**NC 143 Improvements
From West Buffalo Creek to
NC 143 Business in Graham County
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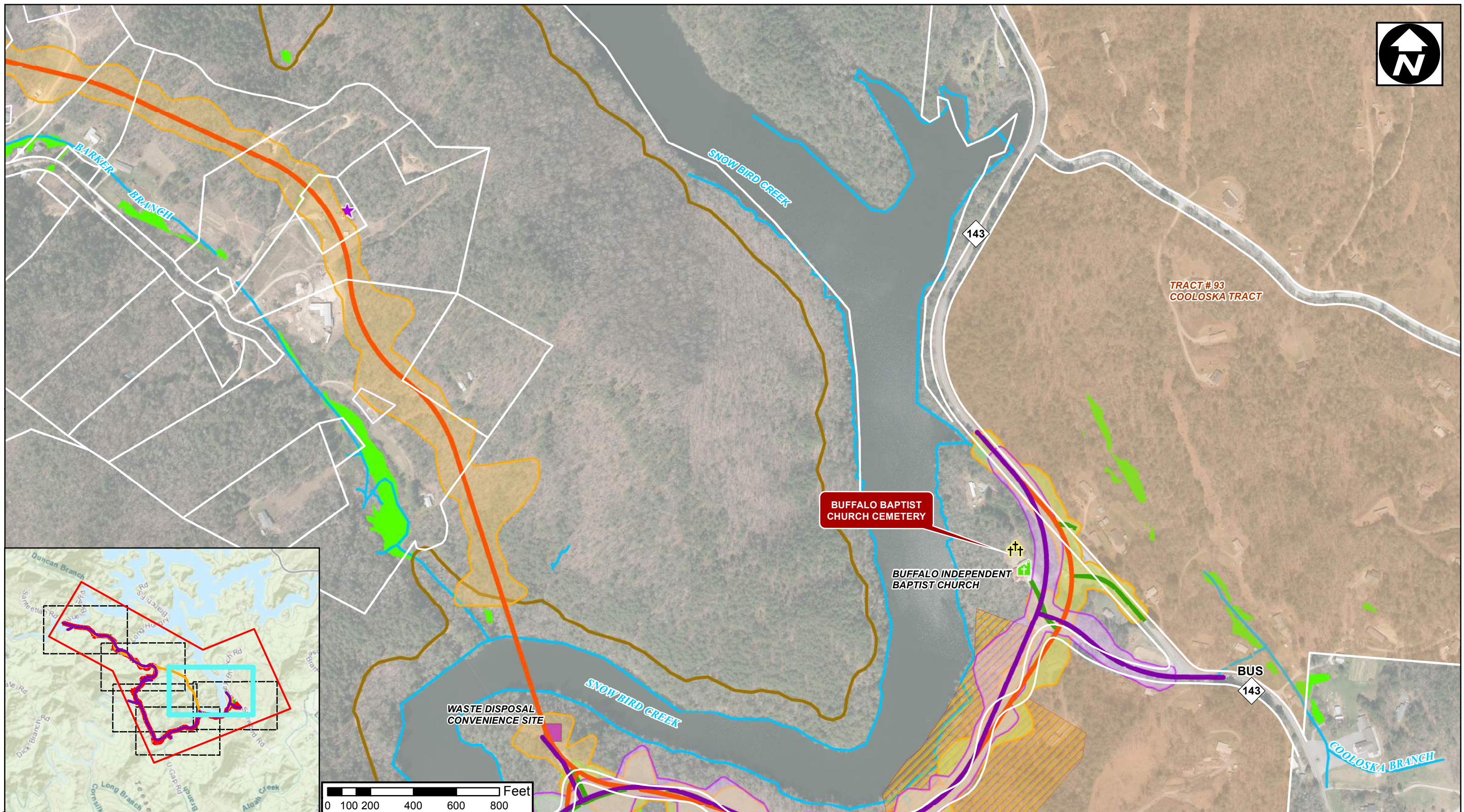
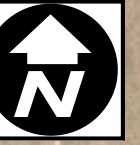


	Existing Bridges		Waste Disposal Convenience Site		Traditional Cultural Properties		Alternative 1 Prop Alignment
	Proposed Study Area		Above Ground Storage Tank		Cemeteries		Alternative 1 Construction Limits
	Exist Property Line		US Forest Service Lands		Churches		Alternative 2- Revised Proposed Alignment
	Exist Hydro Jurisdictional Stream		USFS Resources		EBCI Tracts		Alternative 2- Revised Construction Limits
	Exist Environmental Wetland Boundary		Santeetlah Lake Bike Trail		Tribal Lands		Alternative 4A Proposed Alignment
					NR-Eligible Archaeological Site		Alternative 4A Construction Limits

**NC 143 Improvements
From West Buffalo Creek to
NC 143 Business in Graham County
TIP R-2822B**

EXHIBIT 2: BUILD ALTERNATIVES

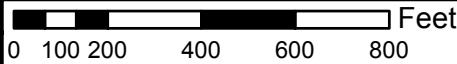
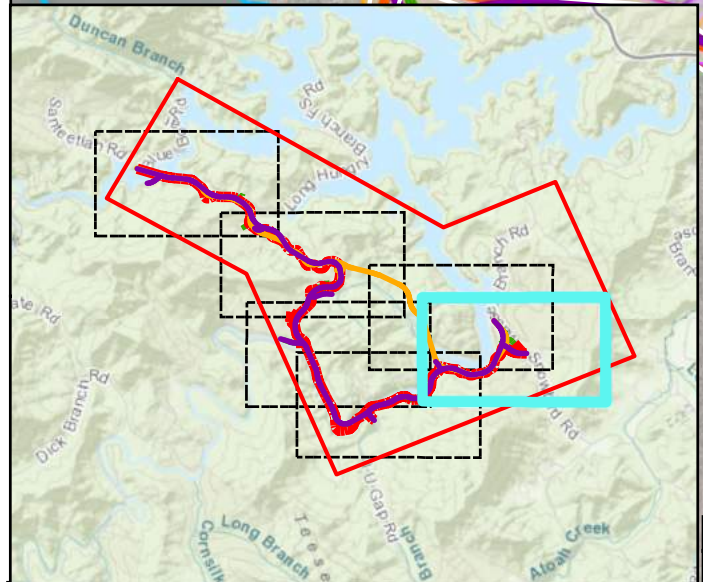
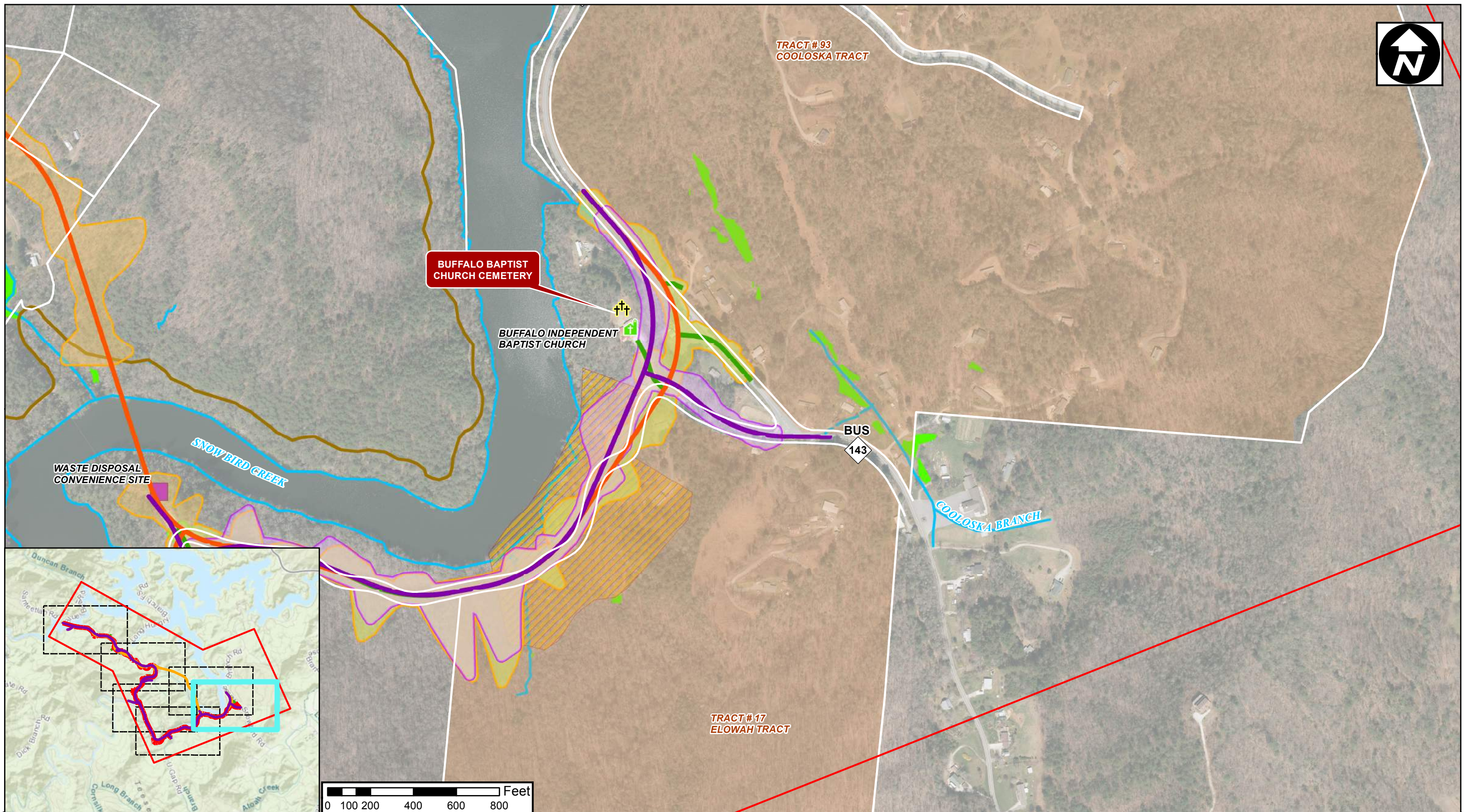
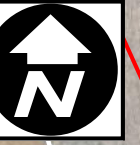
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|--------------------------------------|---------------------------------|---------------------------------|---|
| Existing Bridges | Waste Disposal Convenience Site | Traditional Cultural Properties | Alternative 1 Prop Alignment |
| Proposed Study Area | Above Ground Storage Tank | Cemeteries | Alternative 1 Construction Limits |
| Exist Property Line | US Forest Service Lands | Churches | Alternative 2-Revised Proposed Alignment |
| Exist Hydro Jurisdictional Stream | USFS Resources | EBCI Tracts | Alternative 2-Revised Construction Limits |
| Exist Environmental Wetland Boundary | Santeetlah Lake Bike Trail | Tribal Lands | Alternative 4A Proposed Alignment |
| | | NR-Eligible Archaeological Site | Alternative 4A Construction Limits |

**NC 143 Improvements
From West Buffalo Creek to
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EXHIBIT 2: BUILD ALTERNATIVES



Existing Bridges	Waste Disposal Convenience Site	Traditional Cultural Properties	Alternative 1 Prop Alignment
Proposed Study Area	Above Ground Storage Tank	Cemeteries	Alternative 1 Construction Limits
Exist Property Line	US Forest Service Lands	Churches	Alternative 2-Revised Proposed Alignment
Exist Hydro Jurisdictional Stream	USFS Resources	EBCI Tracts	Alternative 2-Revised Construction Limits
Exist Environmental Wetland Boundary	Santeetlah Lake Bike Trail	Tribal Lands	Alternative 4A Proposed Alignment
		NR-Eligible Archaeological Site	Alternative 4A Construction Limits

**NC 143 Improvements
From West Buffalo Creek to
NC 143 Business in Graham County
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