EXECUTIVE SUMMARY

The North Carolina Forest Service (NCFS) requested a Master Plan be developed to identify potential stream restoration projects with the goals of improving water quality and ecological functions of the Linville River and tributaries on the Gill State Forest in Avery County, North Carolina. The NCFS contracted with Stantec to prepare this report, which documents existing conditions, summarizes stakeholder input, and presents conceptual design information for potential river restoration projects within the State Forest.

For the purposes of this study, the Linville River within the property has been separated into three reaches:

- Reach 1: Sloop Dam to approximately 100 feet upstream of new bridge (4,400 feet)
- Reach 2: 100 feet upstream of new bridge to private property boundary (2,900 feet)
- Reach 3: Private property boundary to Greene Road bridge (1,400 feet)

Two perennial tributaries enter the Linville River within these extents. The project for Reach 2 of the Linville River also includes improvements to Tributary 1, while the project for Reach 3 includes improvements to Tributary 2.

Primary goals of potential river restoration include: enhancement of trout fisheries, improved flood protection for facilities, and increased opportunities for education, public visibility, and utilization of the Mountain Training Facility.

The river corridor does include active fields, a gun range, two bridges, and multiple utilities. Multiple parcels of private property are located along portions of the Linville River. In addition to these physical constraints, any restoration project needs to include consideration of public access, maintenance, and the potential for disruption of nursery or training center operations.

Restoration components, benefits, and constraints for potential projects are summarized in the following table.

Reach	Project Elements	Primary Benefits	Constraints
1	- Bankfull bench creation (600 ft) - Increased floodplain access - In-stream structures (3) - Changes to cross-section dimension - Streambank stabilization - Vegetation enhancement	- Habitat improvement - Bank protection	- Private property - Existing fields - Bedrock
2	- Channel realignment (2,450 ft) - Floodplain creation - In-stream structures (10) - Infrastructure protection - Remove low water bridge - Vegetation enhancement - Wetland enhancement - Tributary 1 improvements	- Habitat improvement - Bank protection - Infrastructure protection - Flood mitigation - Improved public access	- Existing fields - Bridges - Utilities - Bedrock - Gun range - Gravel road - Intake structures
3	- Channel realignment (1,400 ft) - Floodplain creation - In-stream structures (5) - Vegetation enhancement - Tributary 2 improvements	- Habitat improvement - Bank protection - Flood mitigation	- Private property - Bridge - Bedrock

Estimated design and construction costs based on the above project elements and attached conceptual designs are $240,000 (Reach 1), $540,000 (Reach 2), and $310,000 (Reach 3). Qualitative evaluations of potential benefits and constraints for the projects are below.

Potential Benefits

	Reach 1	Reach 2	Reach 3
Reduction of bank erosion	Moderate	High	High
Floodplain creation/enhancement	Moderate	High	High
Wetland creation/enhancement	Low	Moderate	Low
Creation/enhancement of in-stream habitat	Moderate	High	High
Infrastructure protection	Low	Moderate	Low
Flood mitigation	Low	Moderate	Moderate
Tributary enhancement	Low	High	High
Visibility and education potential	Low	High	Moderate
Overall Potential Benefit	**Low-Moderate**	**Moderate-High**	**Moderate**

Constraints

	Reach 1	**Reach 2**	**Reach 3**
Impact to existing fields	Moderate	Low	Low
Impact to existing utilities and infrastructure	Low	Moderate	Low
Private property	Moderate	Low	High
Vertical limitations due to bedrock	Moderate	Moderate	Moderate
Difficulty of equipment access	Moderate	Low	Low
Overall Constraints	**Low-Moderate**	**Low-Moderate**	**Moderate**

Of the three potential projects, Reach 2 provides the highest overall benefit toward achievement of project goals, followed by Reach 3, then Reach 1. Constraints for Reach 1 and 2 are fairly low; Reaches 1 and 3 may have limitations due to multiple private landowners on one side of the Linville River. This validates the decision by the NCFS to pursue grant funding for restoration of Reach 2 as the initial restoration effort to demonstrate successful river improvement as a model for future projects.