Hickory Nut Gorge

Recovery Plan

HENDERSON COUNTY

EQUINOX

balance through proper planning

December 2025

Table of Contents

Acknowledgments

Henderson County and Equinox extend sincere appreciation to the residents, stakeholders, and members of the Hickory Nut Gorge Group who contributed their time, insight, and lived experience to this recovery plan.

Their participation through meetings, surveys, discussions, and shared stories was essential in shaping meaningful recommendations. The collective expertise and commitment will help guide long-term recovery and resilience efforts in the Gorge for decades to come.

A special thanks for the following individuals and organizations who helped support the development of this plan:

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Executive Summary

The Hickory Nut Gorge in Henderson County encompasses a rich ecological history that shaped development patterns in the area. In late September 2024, those patterns were tested after the devastating impacts caused by Tropical Storm Helene. One encouraging lesson we take from natural disasters is the way they awaken an instinctive drive to support one another. Neighbors go out of their way to help neighbors, and the community unites in the face of adversity. These moments reveal resourcefulness and resilience, as individuals contribute skills toward to support the collective good and helping people return to safety. In the aftermath, local heroism was displayed by numerous people in the Gorge and continues to this day. Some of these individuals helped shape the recommendations in this Recovery Plan, developed by Henderson County as a roadmap for long-term recovery and resilience.

"The only constant is change, but I think it can be made better, especially with the county and everybody coming together."

– Bat Cave Volunteer Fire Chief Steve Freeman

In May 2025, Henderson County contracted with Equinox, a local environmental planning and design firm, to lead a consultant team and a community-driven planning process and produce a long-term recovery plan. The County also formed a Community Partners Group (Hickory Nut Gorge Group, "HNG Group") consisting of residents, business owners, and property owners that served in an advisory role to the project team, ensuring that community engagement strategies and recommendations were grounded in local knowledge. The project team included NCDOT, local fire departments, emergency management staff, and Conserving Carolina. This planning effort was built upon the Henderson County "Recovery Taskforce" that launched in November 2024 to focus on immediate and short-term recovery needs, which served as the County's connection to the state's ReBUILD NC Recovery Taskforce.

During the robust community engagement process, the project team received 180 survey responses and hundreds of comments, ideas, and specific locations for recovery that helped shape and prioritize project recommendations. Based on this feedback, project recommendations were divided into eight recovery themes: Environment, Infrastructure, Emergency Preparedness, Recreation, Community, Land Use, Housing, and Tourism & Economy.

As a result of the community-driven process, over 46 recommended recovery projects were identified. Of these projects, the community and the HNG Group identified 17 high-priority projects.

These efforts have produced a clear and actionable blueprint for long-term recovery and community resilience in the Hickory Nut Gorge. By fostering consistent communication and collaboration, the County, along with support from the HNG Group and key stakeholders, can strategically align funding mechanisms and implement priority projects. Planning for recovery ensures that the community does not simply react to a disaster but rebuilds with intention, coordination, and long-term vision.

Community Resilience Inspired by Nature

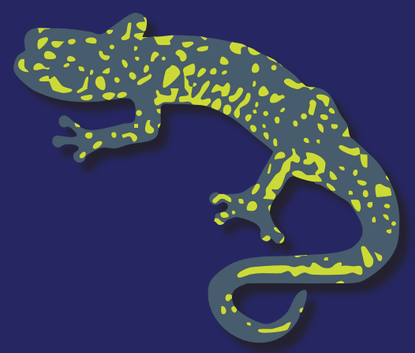
The qualities of the HNG Green Salamander provided inspiration for this plan on how communities can rebuild and adapt when living in a dynamic environment.

The Hickory Nut Gorge is the only place on Earth where the Hickory Nut Gorge green salamander is found, a species currently under consideration for federal protection. Shaped by isolation, rugged terrain, and a unique climate, the Hickory Nut Gorge green salamander (Aneides caryaensis) lives in the lush forests and steep rocky terrain of the Gorge and spends its summers roaming green treetops and its winters hunkered down in rock crevices.

The one-of-a-kind nature of the Hickory Nut Gorge green salamander makes it an excellent ambassador for the folks who live there. Like the Hickory Nut Gorge green salamander, the people of the Gorge are also required to be adaptive and resilient in order to survive and flourish.

Helene produced flooding and debris flows that resulted in the loss of life, destruction of property, and the erosion of confidence in some of our social infrastructure systems. Simultaneously, it has brought out the best in a community of resilient people.

This Recovery Plan is an opportunity to plan for the future and help the people of the Hickory Nut Gorge rebuild their way of life, including their connection to a unique place, ecological setting, and natural heritage.



Top Priority Recovery Projects

- **Strengthen Support For Volunteer Fire Department**
- **Integrated Forest Recovery & Hazard Fuel Reduction**
- **Bat Cave Recreation Corridor**
- **Restore Stream Channel & Floodplain Along The Rocky Broad River**
- **Convenience & Recycling Center**
- **Hickory Nut Gorge Regional Recreation Plan**
- **Bearwallow Mountain Road Paving & Drainage Project**
- **Siren Alert System & Public Education Campaign**
- **Strategic Buyout Parcel Reuse Plan**
- **Rocky Broad River Park**
- **Bridge, Culvert, & Erosion Control Improvements**
- **Signage Package**
- **Reestablish Upper Hickory Nut Gorge Community Center As A Community Hub (To Include Community Park & Memorial Garden)**
- **Reedy Patch Creek Enhancements**
- **Restore Stream Channel & Floodplain Along Hickory Creek**
- **Middle Fork Road Reconstruction**
- **Explore A Landslide Early Response And Monitoring System**

Photo Credit: Harvey Nix

Photo Credit: Patrick Barnes

Photo Credit: Harvey Nix

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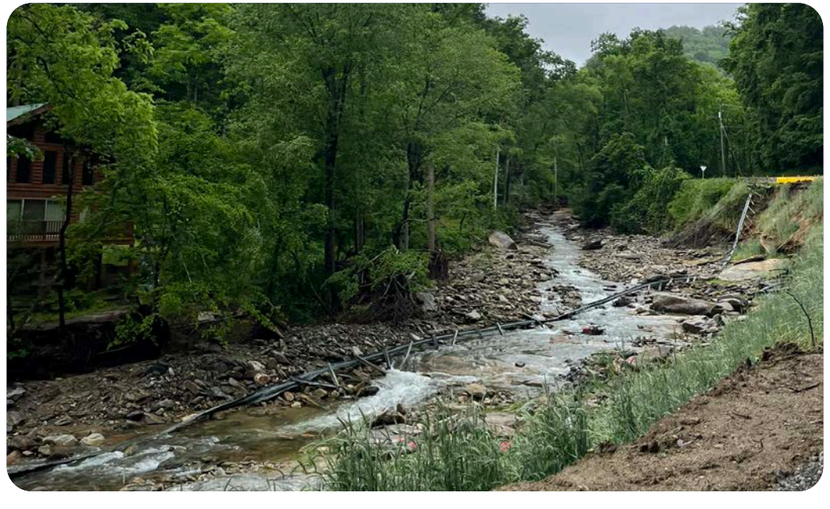


Photo Credit: John Anderson

Chapter 1: Introduction

Why do this plan?

Purpose

The Hickory Nut Gorge Recovery Plan (HNG Plan) is a long-term plan to guide rebuilding, recovery, and resilience efforts over the next two to ten years in Henderson County's Hickory Nut Gorge communities – Gerton, Bat Cave, and a portion of Edneyville – in the aftermath of Tropical Storm Helene. This plan was a community-driven effort, which means that the community helped shape and prioritize recommendations in the final plan. Henderson County Commissioners appointed the Hickory Nut Gorge Community Partners Group (HNG Group) that advised the project team throughout the process. The project team launched a community survey and hosted two community meetings, which allowed local residents to contribute during key project milestones.

Where is Hickory Nut Gorge?

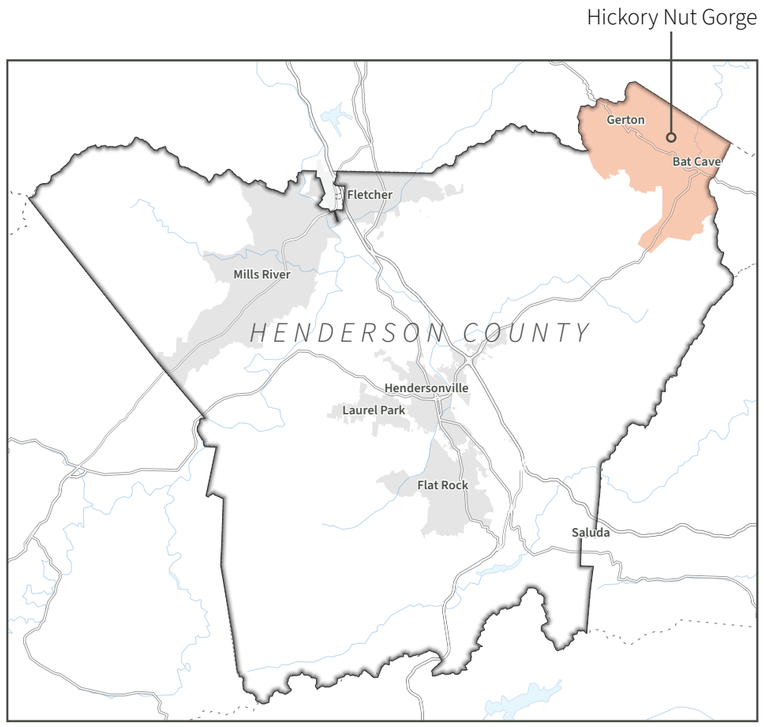
The planning area mainly represents the far northeast corner of Henderson County, which is bordered by mountainous terrain that creates a geographic distinction between the rest of the county. The area has significant frontage on Hickory Creek, Reedy Patch Creek and the Rocky Broad River. Communities within the Gorge include Gerton, Bat Cave, and a small portion of the US 64 corridor in Edneyville.

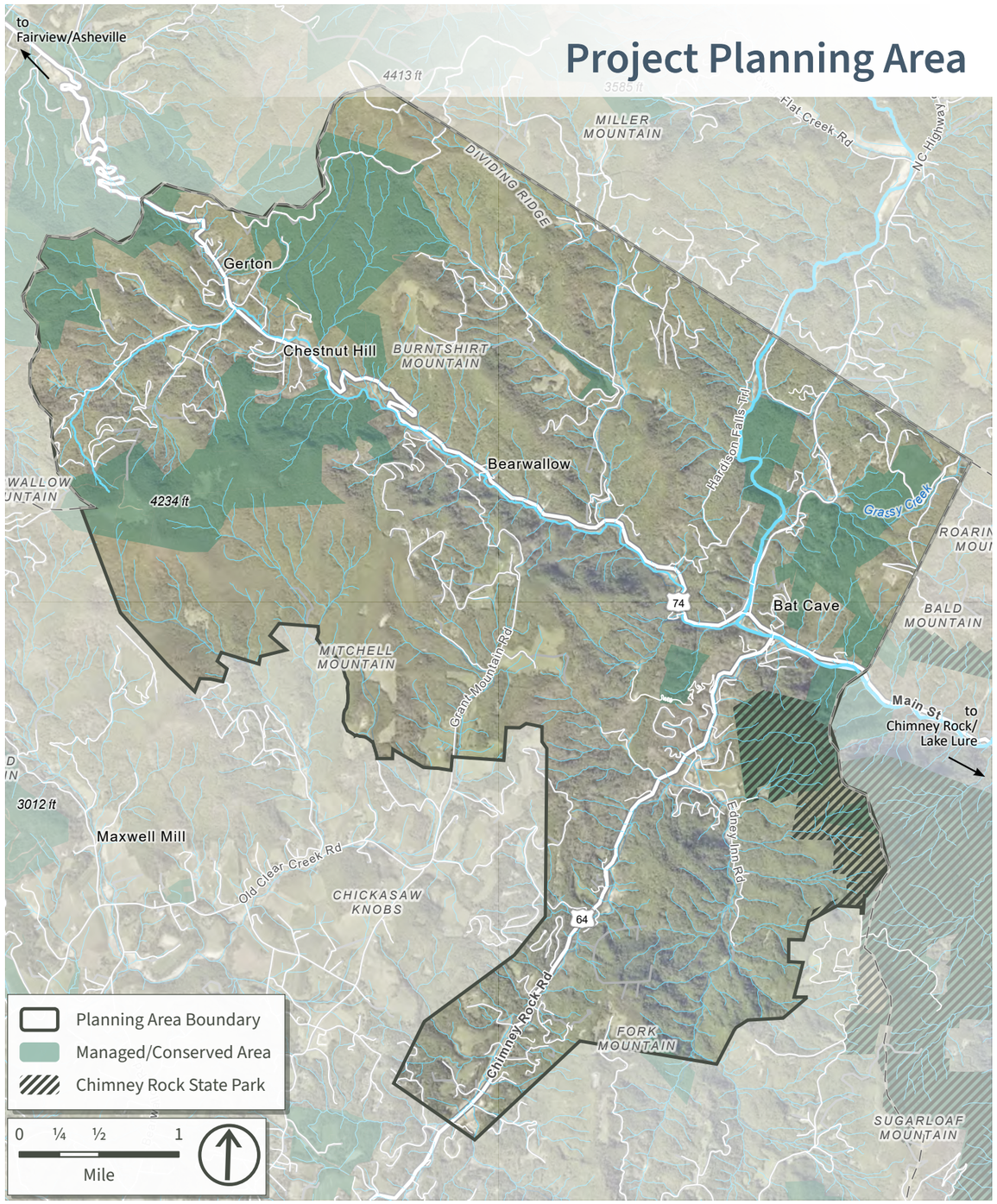
Henderson County is located in the mountains of western North Carolina. The county borders South Carolina to the south and Buncombe County to the north; the City of Asheville is approximately 30 minutes from the county seat in Hendersonville. The county is approximately 375 square miles and has six incorporated municipalities. According to the 2020 US Census, the county's estimated population is 116,281. The population of the HNG planning area, as of 2020, is 844.

Bat Cave Preserve

Within the Gorge are well known bat hibernacula that collectively are known as Bat Cave Preserve. It includes the world's largest augen granite fissure cave. It's the very feature that gives unincorporated Bat Cave its name and provides much of the identity to the area overall. Both items are specific, unique environmental features in the gorge and future recovery work should ensure that neither are negatively impacted and even strive to help improve current conditions. The bat cave itself is closed to the public to help prevent the spread of diseases that endanger bat populations.

Tricolor Bat





Hurricane Helene

A Storm of Historic Magnitude

In late September 2024, Hurricane Helene coursed through the southeastern United States, unleashing torrential rainfall, flooding, and landslides across six states. The storm carried immense moisture into the Appalachian terrain, dropping up to 30 inches in some places, where steep slopes accelerated runoff and destabilized forests and soils. Researchers described Helene as a geomorphic event, one that permanently altered mountain watersheds, triggering over two thousand landslides and cutting new stream channels across the region. Helene revealed not only the vulnerabilities of infrastructure and housing but also the fragility of the region's natural systems. It served as a stark reminder that resilience must be integrated into how mountain communities live, plan, and rebuild.

What Happened in the Gorge

By the time it arrived in North Carolina, Helene was downgraded to a Tropical Storm, however it still caused catastrophic flooding and 171 landslides in the Hickory Nut Gorge planning area. Over 100 individuals had to be rescued via helicopter from the Gorge, and two people's lives were lost. Many homes and businesses were destroyed or uninhabitable due to water damage, landslides, and road and bridge washouts. The Rocky Broad River carved new channels through valleys and forests. Debris filled waterways, and the area's recreation assets including trails and river crossings were inaccessible.

Major thoroughfares, US 74A and US 64 were severely damaged or destroyed in some areas. For weeks after the storm, access to get in and out of the area was very limited. To re-establish access, NCDOT built a temporary road to connect Bat Cave with Chimney Rock in Rutherford County. Engineering is ongoing for the final road design. The Federal Highway Administration (FHWA) and Federal Emergency Management Agency (FEMA) permitted the North Carolina Department of Transportation (NCDOT) to rebuild US 74A to a more resilient standard. Construction of this project is planned to be completed by Spring 2027.

Photo Credit: John Anderson

The Great Flood of 1916

In July 1916, two successive tropical systems converged on the southern Blue Ridge Mountains, dumping more than twenty inches of rain across parts of western North Carolina, which flooded communities in the Hickory Nut Gorge. The resulting deluge sent rivers soaring above flood stage, triggered hundreds of landslides, and destroyed homes, bridges, railroads, and farmland throughout the region. The flood remains one of the most devastating natural disasters in Appalachian history, a reminder that the steep slopes and narrow valleys of this landscape are inherently prone to intense rainfall and rapid runoff.

Forecasts during Hurricane Helene drew direct comparisons to the disaster of the Great Flood of 1916. The North Carolina Geological Survey and UNC–Asheville's National Environmental Mapping & Applications Center (NEMAC) developed an interactive GIS StoryMap that explores the meteorology, geology, and human impacts of the Great Flood illustrating its vast reach and long-term effects across Western North Carolina. This tool provides crucial historical context for understanding modern vulnerabilities and helps inform more resilient land use and infrastructure decisions.

Key Takeaway:

These occurrences are a natural phenomenon of this mountain environment, an inherent part of living within the dynamic ecology of the Southern Appalachians. For communities like those in the Hickory Nut Gorge, it underscores that flooding and landslides are not isolated incidents but recurring natural processes that must guide how community leaders plan, build, and recover.

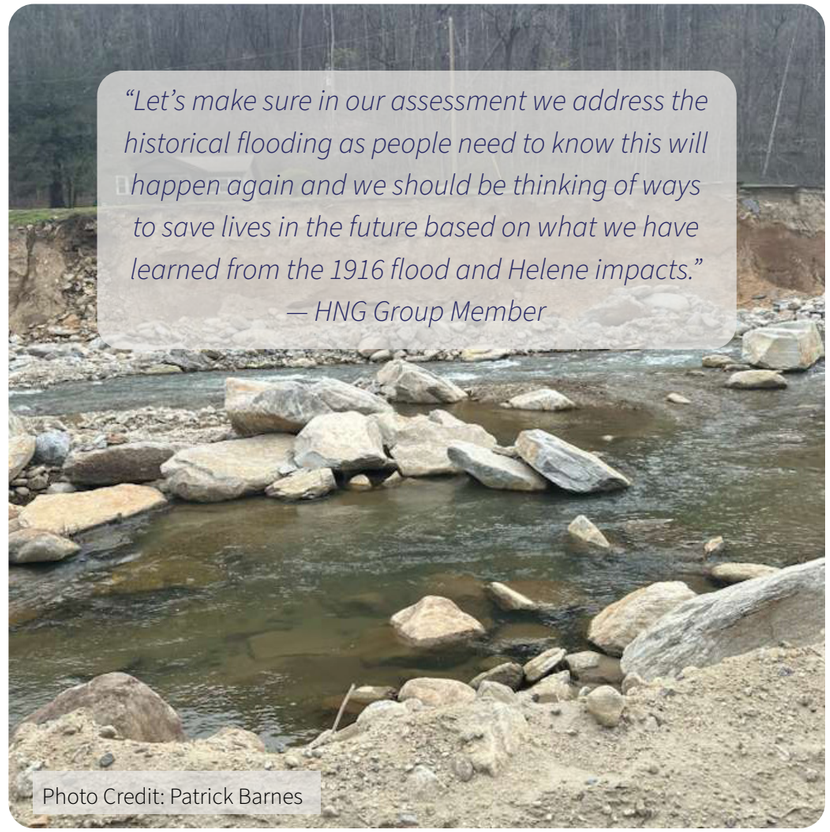
Bat Cave's Main Street after the flood of July 16, 1916.

Photo Credit: Wilson Library at UNC

Flooding in Gorge

The Great Flood of 1916 was the benchmark event, but it is important to know that there have been several incidents of severe flooding in Hickory Nut Gorge since that time.

- In 1996, a heavy rain event dumped 13 inches of rain in the Gorge and caused the worst flood event since the Great Flood of 1916. (Herald-Journal, September 7, 1996)
- 2004 (Hurricanes Frances & Ivan): Resulted in more landslides and widespread damage in the gorge area.
- In 2006, 200 people were evacuated from homes and campground in the Hickory Nut Gorge due to heavy rain and high water. (WFMYNews2, Greensboro, June 26, 2006)
- 2008 (Tropical Storm Fay): Triggered landslides, highlighting ongoing flood risks.
- 2012-2014: A series of high precipitation events led to numerous landslides, including a major debris flow in 2013.



"Let's make sure in our assessment we address the historical flooding as people need to know this will happen again and we should be thinking of ways to save lives in the future based on what we have learned from the 1916 flood and Helene impacts."
— HNG Group Member

Photo Credit: Patrick Barnes

What's Included in this Recovery Plan?

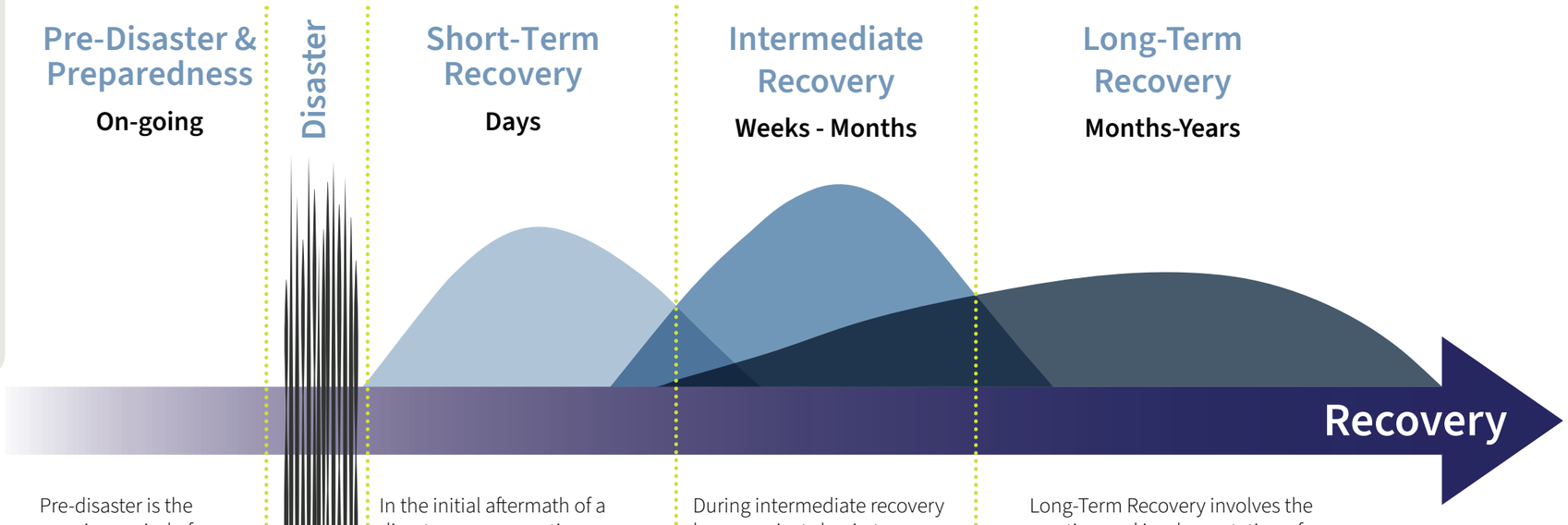
The Recovery Plan is organized around three core components.

1. The Assessment & Mapping Analysis section examines existing conditions, the impacts of Helene, and lessons learned from comparable recovery efforts.
2. The Community Engagement section highlights the collaborative process that shaped the plan, including input and stories from the HNG Group, community survey, and community meetings.
3. The Recommendations section outlines actionable strategies for rebuilding safer, stronger, and more sustainably in the following recovery areas: Environment, Infrastructure, Emergency Preparedness, Recreation, Community, Land Use, Housing, and Tourism & Economy. The recommendations feature local partners that have been identified and if they are willing can align and lead implementation of the recommended projects.

The result is a plan that balances community priorities, professional expertise, and guidance for the road ahead.

The Process of Disaster Recovery

When catastrophic disasters hit an area, recovery can be frustrating, time consuming, and challenging — especially for those who were most impacted by the disaster. Recovery takes many forms and requires different timelines, which can be broken in to short-term, intermediate, and long-term recovery. This graphic helps explain these stages of recovery and actions that occur in each one. This document is a milestone in the long-term recovery of the Hickory Nut Gorge, its goal is to address long-term recovery needs of the Gorge as well as to help plan and prepare for the next disaster.



Pre-Disaster & Preparedness — On-going

Pre-disaster is the ongoing period of community growth and development. This period includes:

- Ongoing work to address community needs and desires
- Defining protocols and plans for what to do in the event of an emergency.
- For individuals, this includes gathering supplies (food, water, first aid supplies, etc.) to sustain themselves in the immediate aftermath of an emergency

Disaster

This represents the impacts of Tropical Storm Helene during Sept. 25-28th, 2024

Short-Term Recovery — Days

In the initial aftermath of a disaster recovery actions include:

- Locating missing people
- Getting help to those in the most need and evacuations when possible and necessary
- Clearing and creation of temporary transportation routes
- Clearing of debris to open necessary pathways and roads
- This phase is when neighbors helping neighbors is incredibly important, as neighbors are often the first to be able to respond and help each other

Intermediate Recovery — Weeks - Months

During intermediate recovery larger projects begin to address the biggest issues. These often require more planning and design - and can seem like recovery is slowing down. These recovery actions include:

- Establishing connected transportation access, intended to last until permanent solutions can be designed and built
- Large-scale and organized debris removal
- Ongoing public health care, including emotional and psychological support
- Long-term planning and design projects begin, with community engagement and input

Long-Term Recovery — Months-Years

Long-Term Recovery involves the creation and implementation of long-term solutions. This planning document represents a key milestone in long-term recovery. Actions in this stage include:

- Seeking funding for recovery
- Planning and designing reslient infrastructure
- Rebuilding infrastructure with resilience in mind
- Economic revitalization actions
- Development of permanent housing solutions
- Implementation of resilience focused preparedness policies, to be better prepared for the next disaster
- As this phase ends it moves into on-going emergency preparedness

Tropical Storm Helene Recovery Timeline in Hickory Nut Gorge

September 25-26, 2024

Hurricane Helene formed September 22, 2024. It intensified into a Category 4 Hurricane before making landfall in Florida. As the storm approached North Carolina, state and regional warnings were issued. Western North Carolina was placed under tropical storm warnings and then Governor Cooper declared a State of Emergency.

BEFORE THE STORM 2024

DURING THE STORM

September 27-28, 2024

By the time Helene hit western North Carolina its wind speed had decreased, recategorizing it as a tropical storm. It's slower speed contributed to it dumping an average of 18 inches of rain across the area, onto soils that were already saturated from earlier rains. This incredible amount of rainfall resulted in massive flooding and over 171 landslides in Hickory Nut Gorge. High winds caused heavy tree blowdown and canopy loss. Two lives were lost.

September 29-30, 2024

Flooding, landslides, and resulting damages destroyed buildings, roadways, and utility infrastructure. A shift in river alignment and channel migration was observed, further disrupting infrastructure and access. Access became severely restricted in Bat Cave and Gerton, most roads, bridges, and crossings were damaged or impassable.

JUST AFTER THE STORM 2024

WEEKS AFTER THE STORM 2024

Late September – Early October 2024

Restoration of power and communications was gradual; many areas remained without service for days to weeks. In Gerton and Bat Cave the local fire stations became a focal gathering point for residents, supply coordination, and volunteer operations.

October - December 2024

Efforts by local residents and volunteer groups continued, coordinating supplies, clearing roads, and helping neighbors. Landslide hazards persisted. In subsequent storms, new landslides continued to occur in areas destabilized by Helene. For instance, reports note at least 15 new landslides in Bat Cave area in days after heavier rainfalls. NCDOT initiated infrastructure repair (roads, bridges, utilities) continues across the region, including in Bat Cave and Gerton. Restoration of communication systems, emergency services, and public infrastructure was incremental.

MONTHS AFTER THE STORM 2024

"No one could have foreseen what this storm brought to us, and now, even months after, some views are still incomprehensible. And worse, the losses of some people are becoming a harsh reality that getting back what was lost may never happen."
— Harvey Nix, HNG Group Member


Credit: NASA Worldview


Photo Credit: John Anderson


Photo Credit: Harvey Nix


Photo Credit: John Anderson

SPRING 2025

March 2025

Henderson County Commissioners approve the funding to hire a consultant firm to create a mid to long-term recovery plan for the Hickory Nut Gorge. Monitoring of landslide-prone slopes continues, as many remained unstable and susceptible to future slide events. Community, nonprofit, and agency collaboration increased to support rebuilding, economic recovery, and hazard preparedness.

EARLY SUMMER 2025

May 2025

Equinox and their team team is hired to develop a recovery plan for this area of Henderson County, with a focus on the communities of Bat Cave and Gerton. The Hickory Nut Gorge Group is established and voted on by county commissioners. This group is a representative subset of residents from the Gorge that assist in directing the planning effort forward. Equinox begins analysis and completes site visits to gain an understanding of the impacts from Helene.

END OF SUMMER

August 2025

A community survey is released to get input from community members who live and work in the Hickory Nut Gorge. During the time that the survey is open, a community meeting is held at the Bat Cave Baptist Church in August, 2025. Over 100 community members provided input and insights on needs for recovery.

FALL 2025

September - November 2025

The Equinox team worked with Henderson County and the Hickory Nut Gorge group to develop a plan including a set of detailed recommendations.

END OF 2025

December 2025

This Recovery Plan is released for the Henderson County sections of Hickory Nut Gorge.

The Hickory Nut Gorge can utilize this plan and its recommendations to guide ongoing recovery efforts.

Photo Credit: Conserving Carolina

Credit: Art by Maddy Kaniewski

Chapter 2: Assessment & Analysis

How to Plan for Recovery

Planning for recovery ensures that a community does not simply react to disaster but rebuilds with intention, inclusiveness, and long-term resilience in mind. Disasters expose existing vulnerabilities—physical, social, economic—and without a clear plan, recovery efforts can become fragmented, unfair, or even counterproductive. As seen in other major disasters, including Hurricane Katrina, top-down approaches often fail because they overlook the lived experience, knowledge, and priorities of the people most affected.

Effective recovery planning must therefore be community-driven, transparent, and collaborative from the start. It must focus on restoring safety and stability while also addressing the deeper systems; land use, infrastructure, housing, culture, and environment, that shape daily life. An impactful recovery plan provides a clear framework for making informed decisions, accessing funding, coordinating agencies, and creating early, tangible wins that rebuild trust. Ultimately, planning for recovery is about moving from crisis to opportunity, strengthening what works, fixing what doesn't, and ensuring that when the next storm comes, the community is better prepared.

Intro to Assessment & Analysis

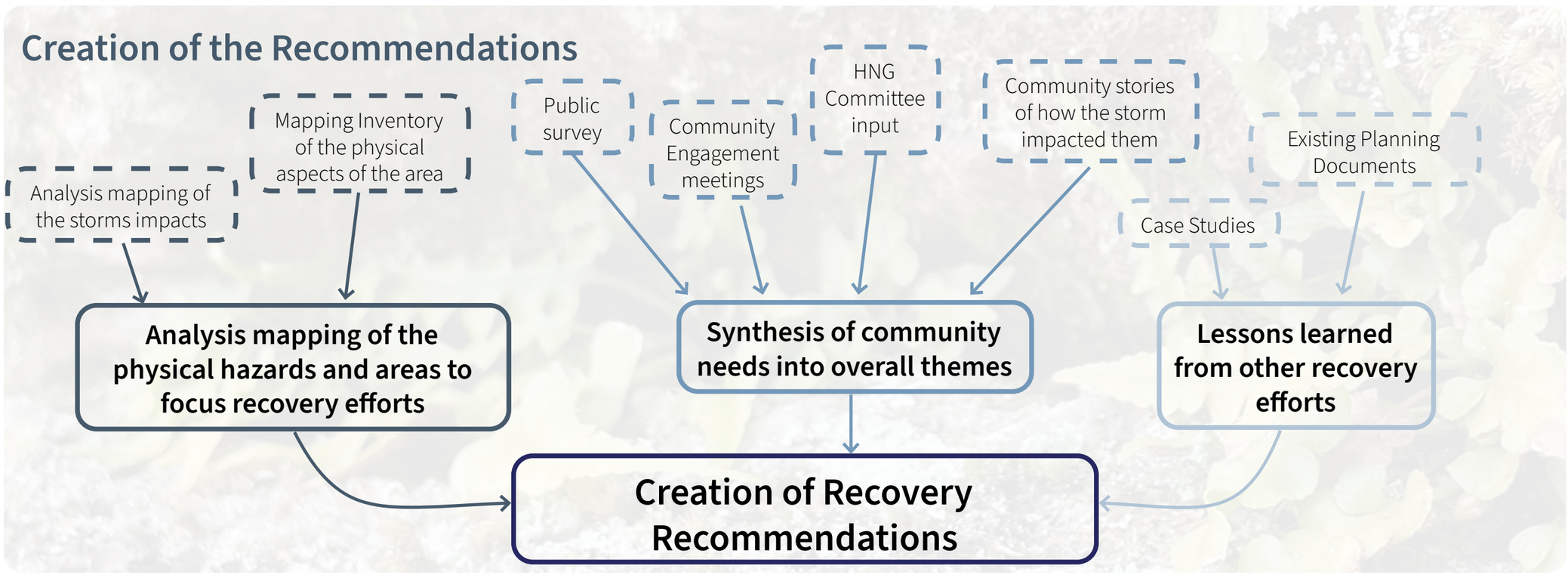
In order to accomplish this, a methodology for assessment and analysis was developed. The following methodology details the data collection and analysis framework used to develop the Recovery Plan for the Hickory Nut Gorge area, including Gerton, Bat Cave, and the US 64 corridor, following the impacts of Tropical Storm Helene. The process is designed to assess the storm's damage to land use, identify key vulnerabilities and risks, inform decisions regarding rebuilding and future land use planning, and ultimately enhance long-term community resilience.

The data collection strategy integrates information from diverse sources to establish a baseline of pre-storm conditions for comparison against post-event impacts. Pre-storm data includes foundational geospatial layers, such as existing land use/land cover, topographic LiDAR, hydrologic data (FEMA FIRMs, NHD), and geological maps identifying rock and soil types and landslide susceptibility. This is supplemented by existing infrastructure, socioeconomic, and environmental records. Post-storm data focuses on quantifying the storm's effects through FEMA damage assessments, high-resolution aerial imagery, field surveys, stream gauge readings, LiDAR change detection for landslides, infrastructure damage reports, and socioeconomic impact surveys. All of this data was used in the development of the recovery plan.

Data analysis was conducted using a mixed-method approach, managing most information within a Geographic Information Systems (GIS) framework. Spatial analysis is central to this methodology, employing overlay analysis to correlate damage with high-risk areas (like floodplains), change detection using remote sensing, and hotspot analysis to identify clusters of severe impact. Hydrologic modeling and landslide susceptibility analysis are utilized to assess future risks based on factors like slope and geology. This spatial data is integrated with statistical and qualitative thematic analysis of community surveys to understand social impacts and recovery priorities.

The synthesis of these quantitative and qualitative findings culminates in a hazard and vulnerability assessment, identifying the areas and populations most at risk. This analysis will inform the development of land use scenarios, land use planning, land use policy, land development, and recovery recommendations. This methodology places specific emphasis on the unique characteristics of the Hickory Nut Gorge, such as its steep slopes, the hydrology of the Rocky Broad River system, and the importance of its way of life for its residents.

Creation of the Recommendations



"Every aspect of how local geomorphology will be impacted by a major climate event such as Helene is unknowable. Its is therefore critical that county planners consider worse case scenarios when developing land use and land development code and regulations."
-Patrick Barnes, HNG Group Member

Review of Existing Relevant Plans – Implications for Hickory Nut Gorge

Henderson County Greenway Master Plan (2019)

The Greenway Master Plan establishes a long-term vision for a connected greenway network across Henderson County. While the Hickory Nut Gorge is not central to the current greenway network, the Greenway Master Plan:

- Reinforces the value of riparian corridors for long-term greenway and ecological use,
- Opens the door for future greenway extensions or conservation-oriented trail planning,
- Aligns well with the reuse of buyout and hazard-prone properties for passive recreation or buffer functions, and
- Recommends using sustainable building methods to link communities through trails and greenways in the floodplain, when appropriate.

Henderson County 2045 Comprehensive Plan (2024)

The Henderson County 2045 Comprehensive Plan is the County's long-range vision and policy guide for growth, land use, and resource management in the unincorporated areas, including the Upper Hickory Nut Gorge.

Key Hazard Zones in the Hickory Nut Gorge

Landslide Threat:

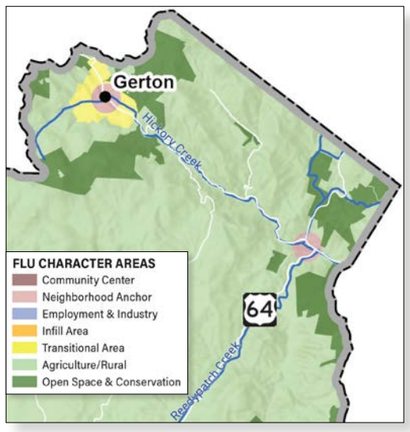
- Much of the Gorge, especially in Bat Cave and Gerton, is marked as **high to very high landslide susceptibility**.
- These areas correspond to steep slopes and unstable soils near ridgelines and along the Rocky Broad River.

Flood Threat:

- **Flood-prone areas** are concentrated along the Rocky Broad River, Hickory Creek, and Reedy Patch Creek.
- These waterways flow through populated corridors, meaning homes and businesses are situated within or adjacent to flood zones.

Future Land Use Vision

In the **Future Land Use Map**, the plan designates most of the Hickory Nut Gorge as **Agricultural/Rural** and **Open Space/Conservation**, which encourages low-density development and promotes land conservation and ecological protection. Gerton and Bat Cave each have a **Neighborhood Anchor** at the center of their community. Gerton's center has a **Transitional Area** surrounding it, which recommends residential areas with limited density, such as conservation subdivisions.



Planning & Policy Implications for the Hickory Nut Gorge

From the Comprehensive Plan's outcomes, several key implications apply directly to the Gorge:

- **Intentional Land Use Planning**
  - Avoid rebuilding in high-risk hazard areas (steep slopes, floodplains, debris-flow zones).
  - Use the Future Land Use Map alongside hazard overlays to guide redevelopment.
  - Encourage conservation subdivisions or clustered development in safer locations.
- **Resiliency of Built & Natural Systems**
  - Protect ridge tops, stream buffers, and steep slopes.
  - Prioritize voluntary buyouts of hazard-prone properties and repurpose them for conservation, greenways, or public river access.
  - Apply nature-based solutions (slope stabilization, stormwater management) in recovery projects.
  - Improve coordination between Emergency Services and Planning to enhance response and recovery readiness.
- **Infrastructure & Connectivity**
  - Coordinate with NCDOT on rebuilding US 74A and US 64 and improving emergency access and multimobility.
  - Explore broadband expansion and fire-resistant construction in Wildland Urban Interface (WUI) areas.
  - Use utility extension and infrastructure upgrade planning to support emergency service reliability, rather than to encourage sprawl.

Note: The **Wildland Urban Interface (WUI)** is the zone of transition between unoccupied land and human development. It is zone where structures meet or intermingle with undeveloped wildland or vegetative fuels (Source: FEMA US Fire Administration).

- **Recreation & Public Health**
  - Identify buyout parcels or flood-prone land that could be repurposed as public river access or greenway segments.
  - Partner with Conserving Carolina, NC State Parks, and other organizations and agencies to support ecological and recreational restoration.
  - Support community resilience through trail infrastructure that connects neighborhoods to nature and services.
- **Housing & Economic Development**
  - Encourage rebuilding and infill in safer, less isolated locations near anchors like Edneyville rather than in hazard-prone zones.
  - Avoid incentivizing development in high-hazard zones simply to recover tax base.
  - Include strategies for seasonal or second-home owners in outreach and long-term planning.
  - Support small businesses and tourism opportunities that align with ecological and cultural values.

In summary, the Comprehensive Plan provides a **countywide framework for intentional growth and resilience** that directly informs the HNG Plan. This means using hazard data to guide recovery, preserving rural and ecological character, strengthening infrastructure and emergency access, and repurposing vulnerable lands for conservation and recreation — all while supporting a resilient, small-scale economy rooted in the Gorge's natural assets.

South Mountains Regional Hazard Mitigation Plan (2025)

The South Mountains Regional Hazard Mitigation Plan (HMP), which includes Henderson County, is a multi-jurisdictional plan required under the federal Disaster Mitigation Act of 2000 and updated every five years to maintain eligibility for FEMA hazard mitigation funding. It addresses regional hazard risks and long-term mitigation strategies. Henderson County is one of the core participants alongside Transylvania, Polk, and Rutherford counties.

The previous HMP covered 2020–2025, so the 2025 update was already underway prior to Tropical Storm Helene. However, the storm's extensive impacts in western North Carolina provided critical new data and underscored the urgency of addressing hazards such as flooding, landslides, and wildfire. As a result, the 2025 Hazard Mitigation Plan reflects both the ongoing statutory update cycle and the lessons learned from Helene, making it a timely companion framework for guiding recovery and long-term resilience efforts throughout the region.

The HMP includes a list of proposed mitigation actions that can be implemented by Henderson County. Several align with the recovery for the Hickory Nut Gorge:

HMP Recommended Action for Henderson County	Connection to Hickory Nut Gorge Recovery Plan
Update steep slope ordinance	Provides stronger zoning tools to guide safe redevelopment in steep terrain areas around Bat Cave and Gerton.
Conduct parcel-level landslide risk assessments	Supports decision-making on voluntary buyouts or rebuilding restrictions for high-risk properties.
Identify and prioritize structures for FEMA buyout	Directly informs voluntary relocation strategies and long-term land reuse.
Explore natural floodplain restoration projects	Aligns with recovery recommendations to restore hazard-prone land as ecological and recreational assets (i.e. greenways, conservation areas).
Develop post-disaster redevelopment plan	The HNG Plan functions as a localized version of this strategy, providing detailed recovery guidance.
Coordinate with NCDOT on resilient transportation planning	Reinforces the need to harden and maintain critical transportation lifelines such as US 74A and US 64) through the Gorge.

Overall, the 2025 Hazard Mitigation Plan offers a strong foundation for integrating resilience into the HNG Recovery Plan. Its hazard-specific data, mitigation actions, and alignment with FEMA funding opportunities make it a critical companion document.

Case Study

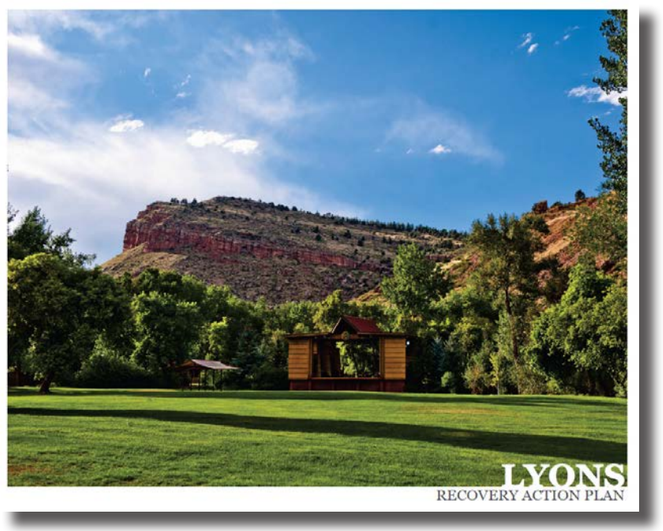
Lessons from the Lyons Recovery Action Plan (2014)

A Model for Integrated, Community-Driven Recovery

After the 2013 Colorado Front Range floods, the Town of Lyons—a small mountain community with limited access routes—faced catastrophic loss of homes, utilities, roads, and local businesses. The Lyons Recovery Action Plan (LRAP) was developed through an inclusive, community-led process that combined urgent repair with long-term vision. The plan became a national model for how small communities can align residents, agencies, and funding partners around shared recovery goals. This is an overview of the review completed, the full case study can be accessed in the appendix.

Recovery Focus Areas

- **Infrastructure & Utilities**: Harden roads, bridges, and utilities with resilient design (elevated crossings, redundant systems, buried lines).
- **Housing & Neighborhoods**: Replace or relocate flood-damaged homes, develop affordable housing on higher ground, and sustain social networks.
- **Parks, Recreation & Open Space**: Rebuild river corridors as multi-benefit greenways that manage floodwaters and provide community space.
- **Economic Recovery & Downtown Revitalization**: Support small businesses with microgrants, shared spaces, and resilience design standards.
- **Community & Social Resilience**: Prioritize mental health, civic engagement, and recovery coordination through local leadership teams.
- **Environmental Restoration**: Restore streambanks, native vegetation, and floodplain function as natural defenses.



Key Recommendations and Best Practices

- **Set Recovery Goals Early:** Define long-term goals in parallel with short-term repairs to guide funding and coordination.
- **Communicate Transparently:** Be honest about recovery timelines—years, not months—while celebrating incremental successes.
- **Prioritize Community-Driven Needs:** Focus recovery on residents' well-being, not just tourism; view recreation as essential infrastructure for physical and mental health.
- **Build Back Better:** Treat every repair as a chance to reduce vulnerability—elevate roads, resize culverts, move utilities out of harm's way.
- **Integrate Environment and Infrastructure:** Align restoration with construction—use green infrastructure, stream buffers, and floodable park designs.
- **Treat Housing and Social Services as Core Infrastructure:** Support housing stability and restore schools, health care, and safety services alongside utilities.
- **Collaborate Across Agencies:** Establish pre-disaster recovery frameworks for expedited permitting, coordinated environmental review, and joint funding between local, state, and federal partners.
- **Institutionalize Engagement:** Maintain stakeholder workshops, volunteer task forces, and transparent communication throughout the recovery process.
- **Think Long-Term:** Recovery is not a return to the past but an investment in a safer, more sustainable future.

Lessons to Inspire Hickory Nut Gorge Recovery Efforts

- **Empower Local Leadership:** Form community-led working groups for recreation, housing, access, etc. to guide recovery priorities.
- **Develop a Regional Recovery Framework:** Coordinate with NCDOT and DEQ to pre-establish permitting and funding protocols for faster post-disaster response.
- **Rebuild for Multiple Hazards:** Integrate flood, landslide, and wildfire mitigation into all rebuilding.
- **Leverage Buyouts for Public Good:** Convert repetitive-loss sites into greenways, river access, and natural flood buffers.
- **Sustain Small Business Recovery:** Create grants, shared retail hubs, and mentorship for displaced entrepreneurs.
- **Communicate with Clarity and Compassion:** Establish regular updates that explain timelines, celebrate progress, maintain public trust, and empathize with existing realities
- **Institutionalize Coordination:** Form a standing Regional Recovery Task Force to track progress and share lessons.
- **Rebuild Social and Emotional Resilience:** Treat community connection, mental health, and storytelling as vital to long-term recovery.

In Essence: Lyons demonstrated that true recovery blends urgency with foresight—rebuilding not just infrastructure, but community trust, partnerships, and purpose. Hickory Nut Gorge communities can draw on these lessons to shape a regional recovery that is faster, fairer, more resilient, and grounded in local leadership, sustained collaboration, and connection to the land. A deeper dive of this case study is located in the appendices.

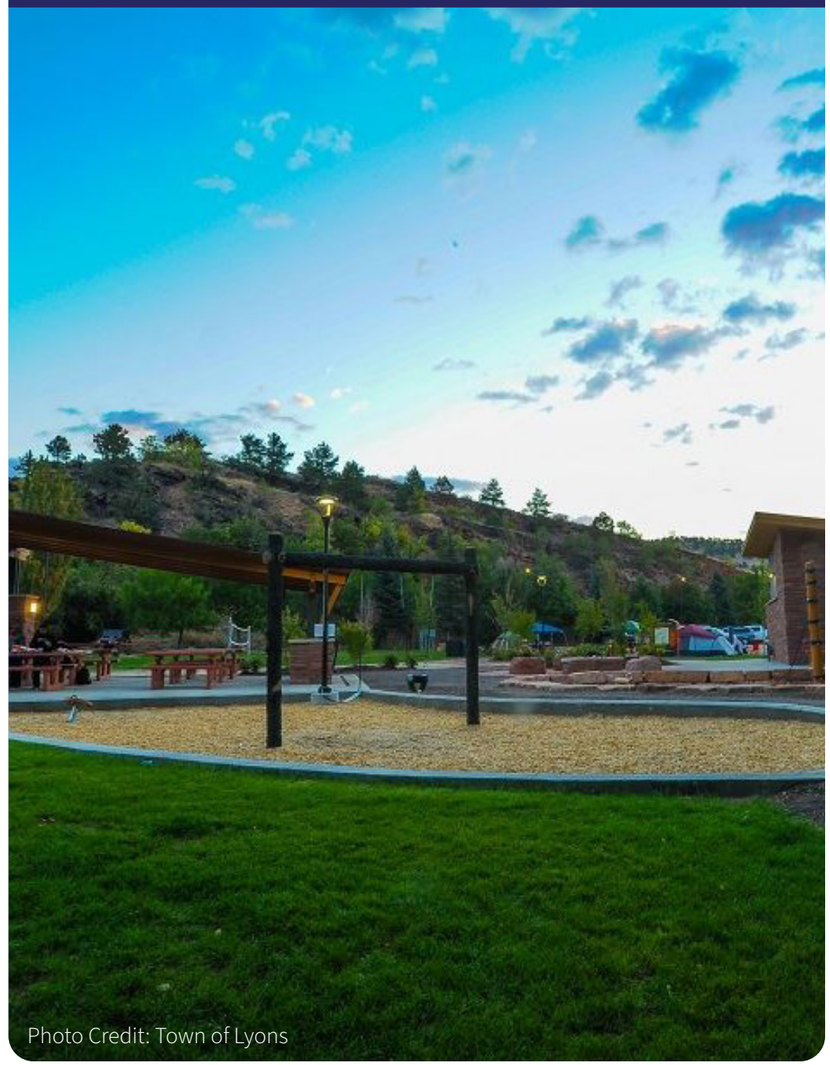


Photo Credit: Town of Lyons

Best Practices to Guide and Inspire Long-Term Recovery

Natural disasters reveal the fragility and core strengths of communities. The most successful recoveries across the country share a common foundation: recovery is strategic, community-driven, and future-focused. The following are national best practices that can guide Hickory Nut Gorge communities on the road to recovery.

1. Recovery Must Be Community-Driven

Effective recovery begins and ends with the people most affected. National lessons show that top-down plans often fail because they overlook local knowledge, lived experience, and cultural ties. Communities that recover well engage residents early, build trust, and empower local leadership to shape decisions.

2. Address the Whole System, Not Just Physical Damage

Disasters expose gaps across housing, transportation, environment, economy, health, and governance. Recovery plans integrate these systems, acknowledging that resilience requires more than rebuilding infrastructure—it requires strengthening social, economic, and environmental networks.

3. Build a Culture of Collective Preparedness

Communities become more resilient when preparedness becomes part of their identity and routine. Education, training, and accessible communication infrastructure are essential.

4. Lead Through Partnerships and Shared Governance

Recovery requires coordination across counties, municipalities, nonprofits, emergency services, state agencies, and federal partners. The strongest recoveries share power, align resources, and formalize coordination.

5. Integrate Land Use, Housing, and Hazard Mitigation

Land use is one of the most powerful tools for recovery. National research shows that resilience depends on avoiding high-risk areas, strengthening building standards, and aligning zoning with hazard realities.

6. Make Economic Recovery a Foundation for Resilience

Local businesses fuel long-term community renewal. Supporting small businesses through grants, expertise, shared workspace, and training accelerates both recovery and economic stability.

7. Use Nature-Based, Multi-Benefit Solutions

The strongest recoveries rebuild with the landscape, not against it. Nature-based solutions reduce flood risk, stabilize slopes, restore ecosystems, expand recreation access, and strengthen local economies.

8. Start Small, Act Fast, and Prototype the Future

Early, visible wins rebuild hope and trust. Pilot projects, pop-ups, and temporary installations allow communities to test ideas, learn quickly, and generate momentum.

9. Build for the Next Crisis, Not the Last One

Helene, much like the Great Flood of 1916, demonstrated that extreme events will recur. National best practices emphasize designing for future climate conditions—stronger storms, more rain, higher landslide risk—not just rebuilding past vulnerabilities.

10. Inclusive Planning

Recovery must not deepen existing disparities. Successful national models prioritize those most at risk of displacement, limited access to assistance, and economic hardship. This requires targeted outreach, culturally responsive engagement, and fair distribution of resources to ensure that support reaches those who need it most.

11. Institutionalize Learning and Adaptive Management

Recovery is a long journey. Communities must build systems that allow them to track progress, adjust strategies, and learn over time.

12. Inspire Collective Action Through Storytelling

Community cohesion is a critical resilience tool. Storytelling helps residents process trauma, share lessons, restore hope, and build a shared identity around recovery and the future.

Mapping Hickory Nut Gorge

Introduction to the Maps

To provide understanding of Helene's impact on Hickory Nut Gorge, the following map series has been developed. The initial set of maps establishes a baseline, illustrating the pre-existing environmental and built conditions of the gorge prior to the September 2024 event. This includes baseline data on topography, historical land use, forest cover, and the location of key infrastructure. Following this, a second set of maps documents the immediate, widespread effects of the storm. These visualizations specifically illustrate the profound changes to fluvial systems, including channel migration and aggradation; the extent of slope failures and landslides; damage to forest canopies; and the significant destruction of infrastructure and housing.

Building upon this post-event damage assessment, the final set of maps transitions from documenting what occurred to identifying future vulnerabilities. These predictive hazard maps are essential for long-term recovery, modeling the potential risk from future events within the altered landscape. They delineate areas now susceptible to debris flows, illustrate flood inundation zones, and identify regions that may face an increased risk of wildfire. Collectively, this map series serves as a foundational tool, providing the spatial information necessary to guide informed land use planning, prioritize mitigation efforts, and steer a resilient recovery for the Hickory Nut Gorge.

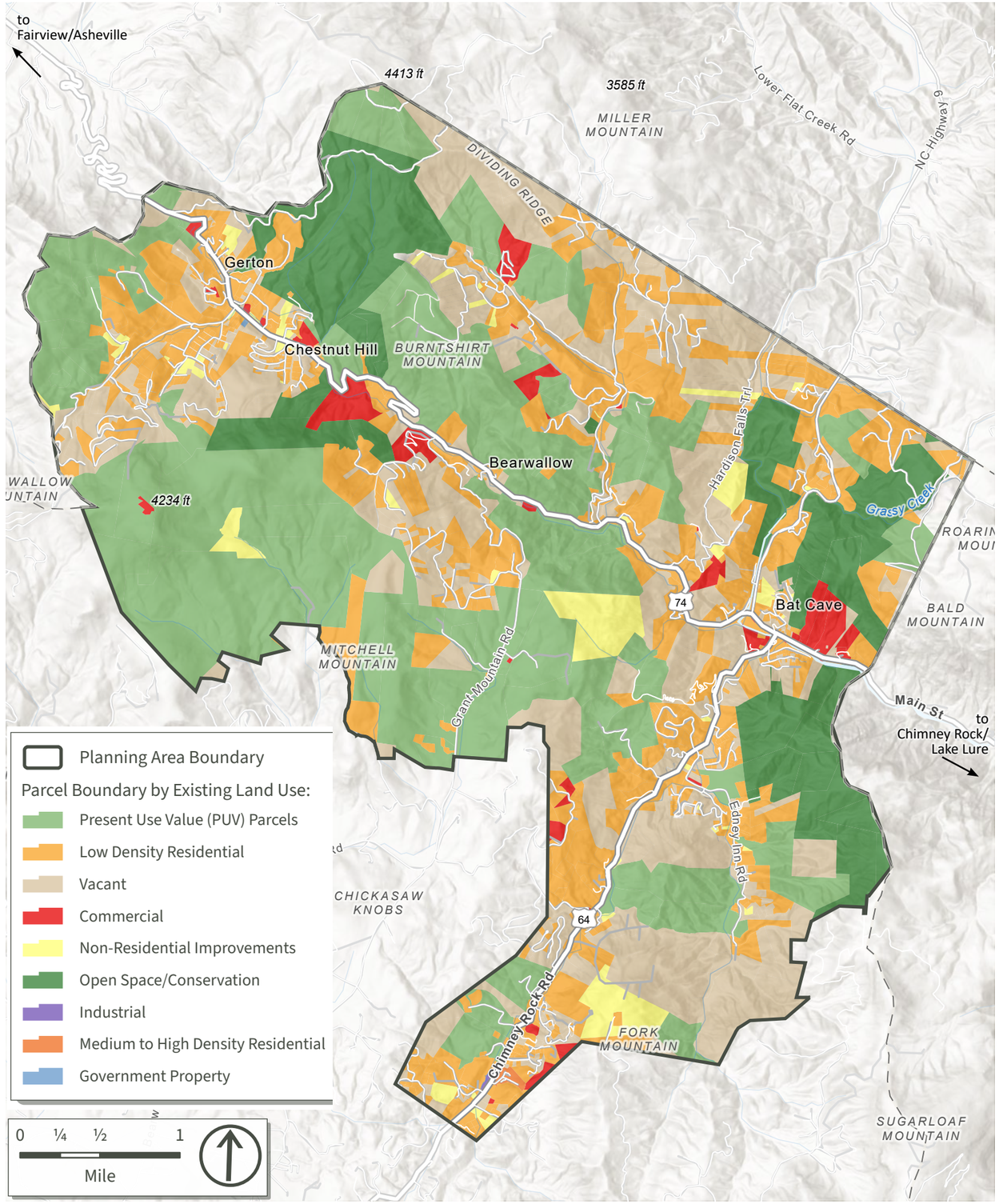
Hickory Nut Gorge By The Numbers:

2 Communities — Gerton, NC; Bat Cave, NC

2 Watersheds — Broad River; Mud Creek

The study area has approximately:

- **14.9** Miles of hiking trails (Conserving Carolina)
- **12,927** Total acres of land
- **27.3** Miles of streams
- Total population **844**
- Median Age **52**
- **2,396** Acres of land in conservation easement
- **76.1** Miles of road
- **1,967** Total parcels
- Median Household Income **$50,000**



Existing Land Use Map

This map brings together multiple datasets to create a current picture of land use in Henderson County, with a particular focus on Hickory Nut Gorge. It integrates county parcel boundaries, building footprints, and address information with land cover data derived from the National Land Cover Database (NLCD). By layering these sources, the map not only illustrates existing conditions but also highlights changes over time, offering insight into both current and historical patterns of development and conservation. It incorporates official and proposed land-use classifications, such as those from the French Broad Metropolitan Planning Organization alongside parcel-level attributes and mailing address records, ensuring that the information is grounded in both regulatory frameworks and on-the-ground realities. Understanding the distribution of land-use categories across Hickory Nut Gorge is essential for shaping future decision-making for recovery.

Slope Map

Hickory Nut Gorge is characterized by its steep and complex topography, significantly influencing the prevalence of flooding and landslides, and necessitating careful consideration for any development.

Hickory Nut Gorge is a steep gorge situated on the edge of the Blue Ridge Escarpment, which marks the geographical boundary between the North Carolina Piedmont and the Blue Ridge Mountains. The gorge drops approximately 2,000 feet between Gerton and Lake Lure. Formation of the gorge is primarily attributed to the Broad River and its swift-moving tributaries carving through Henderson gneiss and eroding rock material.

This map depicts percent slope across Hickory Nut Gorge. The darker areas shown have steeper slopes than the lighter areas. Note how little of the lighter colors are present on this overall map.

Typically, slopes steeper than about 35% should be avoided for development due to costs and hazards associated with steep slopes, including increased potential for landslides and the loss of life and property. Based on Digital Elevation Model (DEM) data, approximately 3 to 5 percent of the land in Hickory Nut Gorge has a slope less than 35%, and the majority of that area is within the floodplain. Moreover, some areas with slopes less than 35% should also be avoided if they are directly adjacent to land with very steep slopes of unconsolidated earth material. As such, areas may represent a very significant landslide threat.

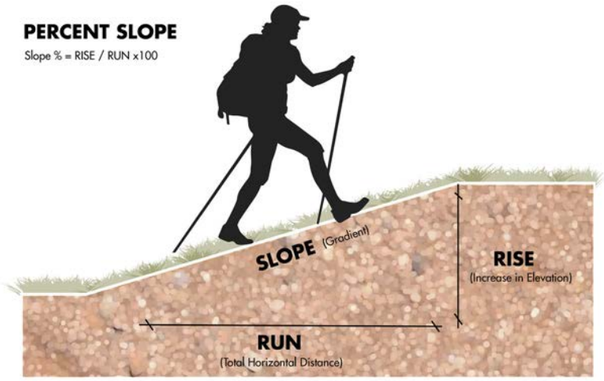
Given the inherent instability of the steep slopes and the history of devastating natural disasters, considering slope for development in Hickory Nut Gorge is imperative. Rebuilding efforts must focus on increasing resilience in new development, buyouts, and hardening critical infrastructure such as roads, bridges, and utilities against streambank erosion and landslides. This includes decisions on permanent roadways on unstable slopes.

Planning Area Boundary

Percent Slope:

Percent (Pre-Helene)

- 0 - 15%
- 15 - 25%
- 25 - 35%
- 35 - 60%
- > 60% Slope



Slope percent is calculated as rise / run x 100. For instance, a 300-ft rise over a 4,000-ft run = 0.075 x 100 = 7.5% slope.

Graphic Credit: Midpeninsula Regional Open Space District.

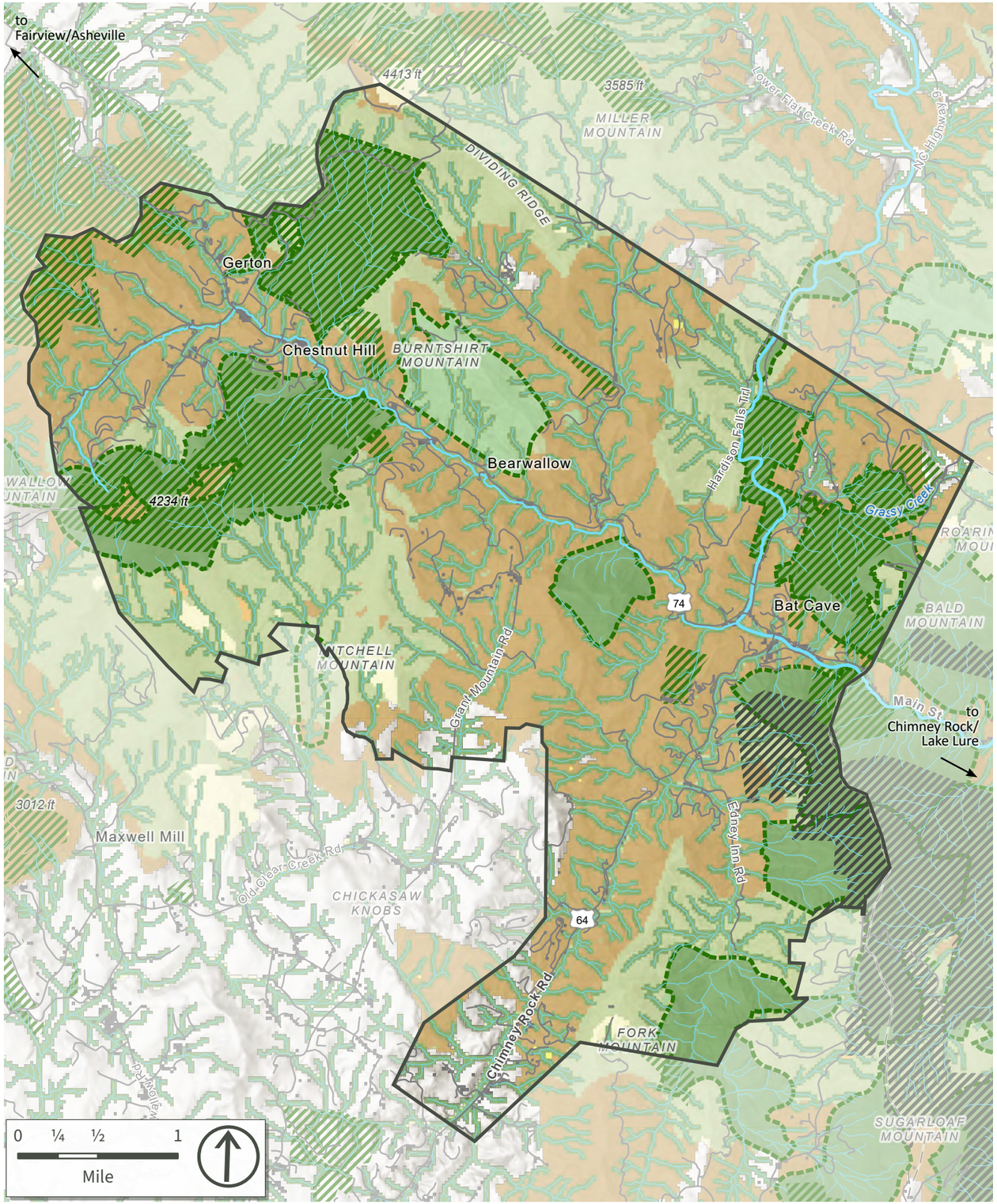
Biodiversity & Wildlife Habitat Map

This map depicts the Relative Conservation Value (RCV) of the landscape within Hickory Nut Gorge. RCV is determined by the NC Natural Heritage Program as part of their Biodiversity & Wildlife Habitat Assessment (BWHA), which includes a wide variety of natural resource related data (streams, wetlands, rare species, critical habitats, managed areas, etc.) that are weighted and compared to produce this map.

The greener an area is, the higher its RCV; the lighter the color, the lower the RCV. Areas lacking color have been developed to the point that habitat integrity is no longer present, and although these areas may contain natural resource elements of conservation value, they are discontinuous, dissected, and therefore cannot be considered in the assessment.

Examples of Threatened and Endangered or Endemic Species that are found in the area:

- Hickory Nut Gorge Green Salamander - *Aneides caryaensis* (Endemic)
- Northern Long-eared Bat - *Myotis septentrionalis* (Federally Endangered)
- Broad River Stream Crayfish - *Cambarus lenati* (Endemic)



- Planning Area Boundary
- Chimney Rock State Park
- Other Managed/Conserved Area
- Natural Heritage Natural Area

Biodiversity/Wildlife Habitat Assessment (BWHA)

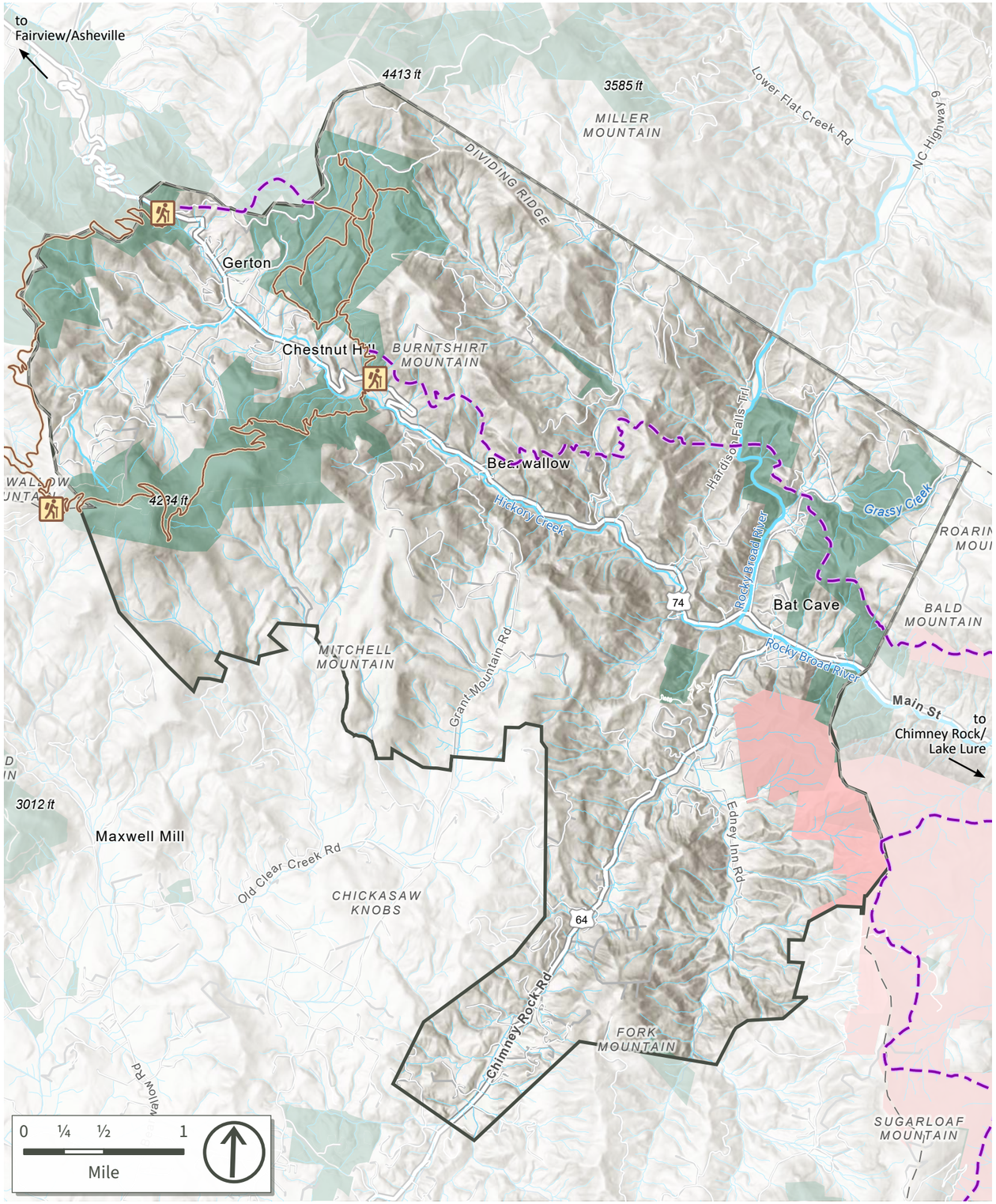
Relative Conservation Value:

- 9-10 (Maximum)
- 8
- 7
- 6
- 5
- 2-4
- 1 (Moderate)
- 0 (Unrated)
- Impervious surface >20%

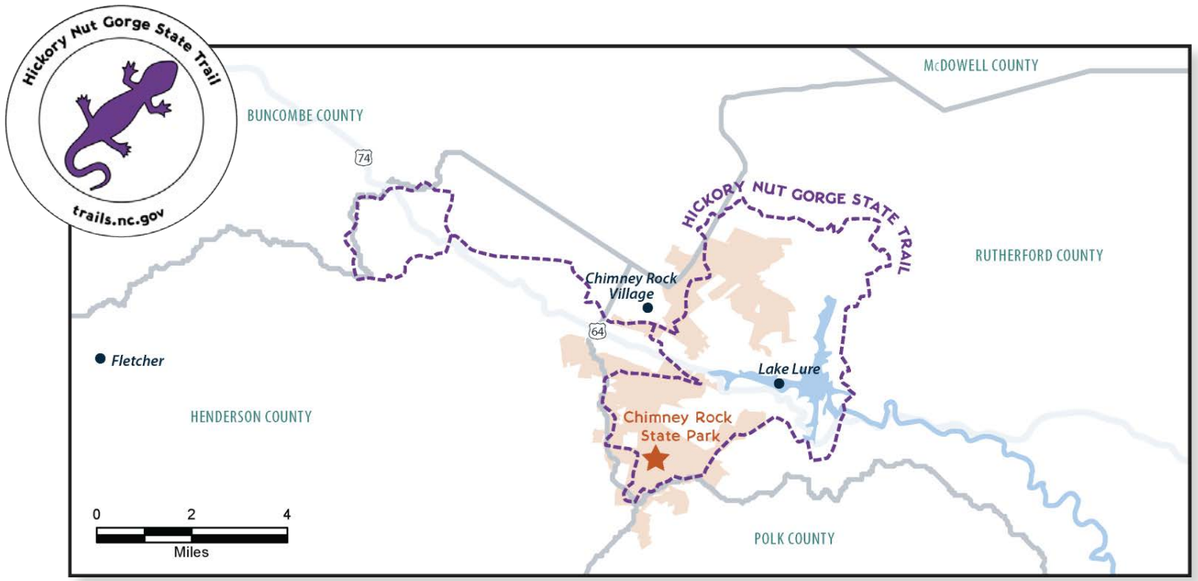
Recreation & Trails Map

The Hickory Nut Gorge is a unique natural area with scenic qualities that can be attributed to the gorge's steep terrain, interesting geology, and diverse ecosystems. Within the gorge there are mountain streams, waterfalls, granite cliffs, panoramic views, scenic overlooks and forested mountains that attract locals and visitors. There are opportunities for a variety of recreation activities such as hiking, camping, scenic drives, bird watching and photography. The Rocky Broad River and tributaries are stocked with trout providing opportunities for anglers. River activities include paddling and kayaking in the Rocky Broad River which offers sections suitable for whitewater kayaking (Class III-V) and swimming in smaller river pools and creeks that do not have fast moving currents

Existing hiking trails that can be found in the gorge include the Bearwallow Mountain Trail, Trombatore Trail, Strawberry Gap Trail, Wildcat Rock Trail, and others in the Florence Nature Preserve. Conserving Carolina, a western North Carolina land trust, owns land and has several conservation easements within Hickory Nut Gorge. These lands contain many of the hiking trails in the gorge and offer additional opportunities for trail development. The Hickory Nut Gorge State Trail (HGST) aims to link parks, preserves, and communities through a 50+/- mile regional trail system which will be ideal for long-distance hiking and biking loops. Much of the land on which the HGST will be constructed is conserved by both Chimney Rock State Park and Conserving Carolina. Shown in purple in the maps on this page, the proposed HGST, connects into the gorge from Chimney Rock State Park, makes its way through Bearwallow on the north side of US 74, and connects to the existing Conserving Carolina trails at Florence Nature Preserve to form a loop with the Strawberry Gap Trail, Trombatore Trail, Bearwallow Mountain Trail, and Wildcat Rock Trail. The full extent of the HGST is shown in the map below, courtesy of the NC Division of Parks and Recreation.



- Planning Area Boundary
- Existing Trailhead
- Conserving Carolina Existing Trail
- Hickory Nut Gorge State Trail Proposed Route
- Chimney Rock State Park
- Other Managed/Conserved Area



Tropical Storm Helene Impacts

What Happened Geologically?

The catastrophic flooding and landscape alteration experienced in Hickory Nut Gorge during Tropical Storm Helene were not a random anomaly. They were the predictable, devastating result of an extreme weather event interacting directly with the region's unique landform, shaped by geological processes. To plan for a resilient future, we must first understand the specific factors that made this area uniquely vulnerable.

Two key factors converged to produce the disaster:

- **Terrain-induced Updraft and Extreme Precipitation:** The abrupt and significant step-up in elevation from the Piedmont to the mountains that characterizes the Blue Ridge Escarpment was the primary driver of the extreme precipitation. As Helene's moisture-laden air masses moved inland from the south, they were forced upward against this topographic wall. This rapid ascent, a process known as orographic lift, caused the air to cool and release an extreme amount of precipitation that exceeded 30 inches in some locations. The mountains' geography effectively "squeezed" the moisture from the storm system at an extraordinary rate.
- **A Topographic Funnel:** This immense volume of water fell onto a landscape shaped to concentrate it. Much of Hickory Nut Gorge formed by a process of "stream capture" that created a vast drainage network. A large, elevated mountain landscape, including areas around Gerton and the Swannanoa Mountains, acted as a massive catchment basin. This entire drainage network funneled collected water directly into the narrow, restricted confines of the gorge, causing destructive flooding within the waterways.

The result was a landscape-altering event, with structures scoured clean and massive debris depositions in Lake Lure. This is not unprecedented; the 1916 flood provides a stark historical parallel. The rugged and dynamic topography that defines the community's beauty also creates inherent, significant risks. Acknowledging this reality, that the landforms of Hickory Nut Gorge can intensify extreme weather, is a foundational first step in building a recovery plan that can withstand future events.

"As I made my way down the road to the fire department, I was absolutely astonished by what I saw. The amount of destruction is something that I hadn't seen since I had served in Afghanistan 13 years prior."
— Collin Stanford, HNG Group Member

Photo Credit: John Anderson

171

Number of recorded landslide events

(the information above is from the post helene landslide inventory, North Carolina Geological Survey section of the Department of Environmental Quality (NCDEQ)

1,086 Total Building Structures - structures assessed post-storm included homes, commercial buildings, auxillary sheds, etc

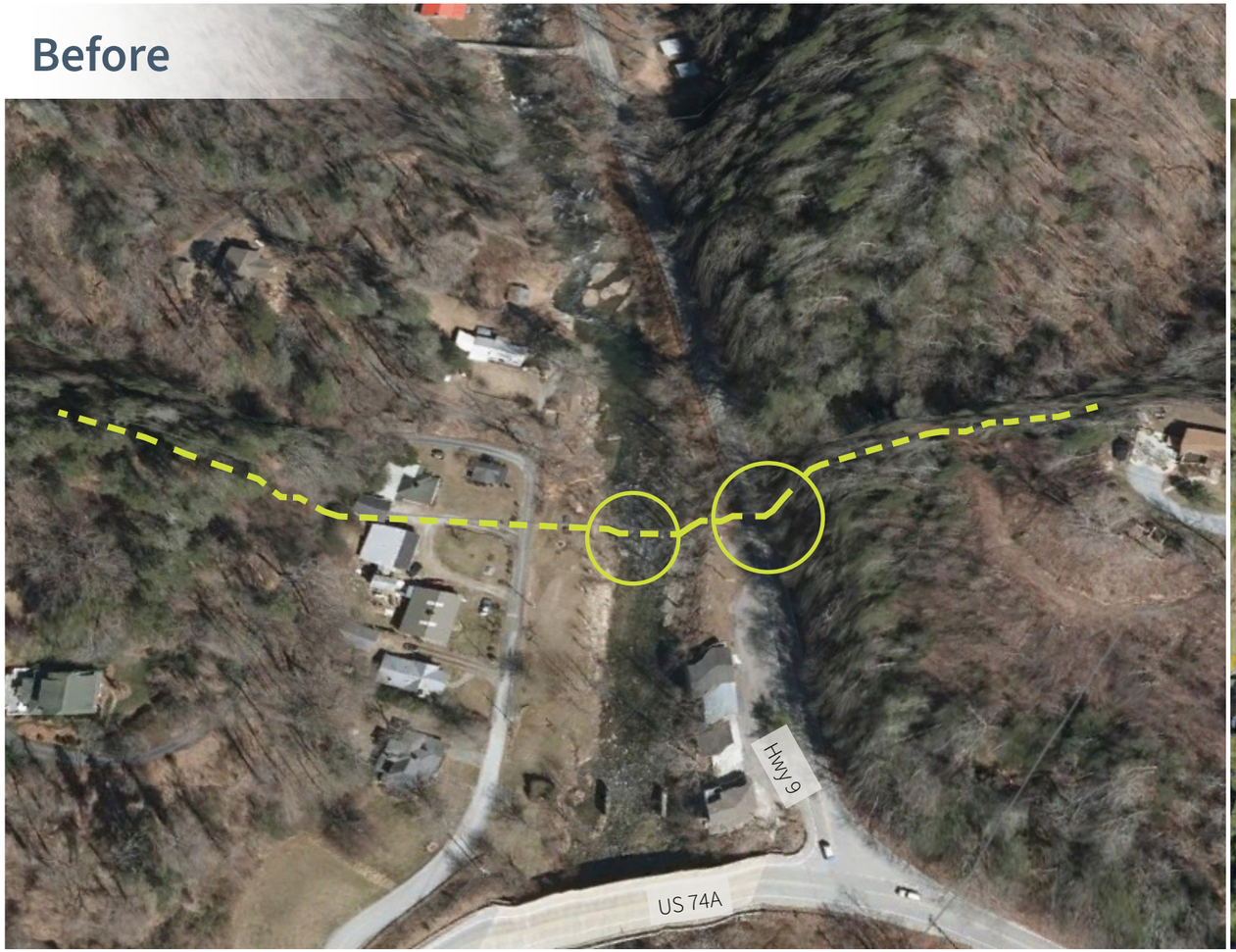
281 Structures Damaged from Storm

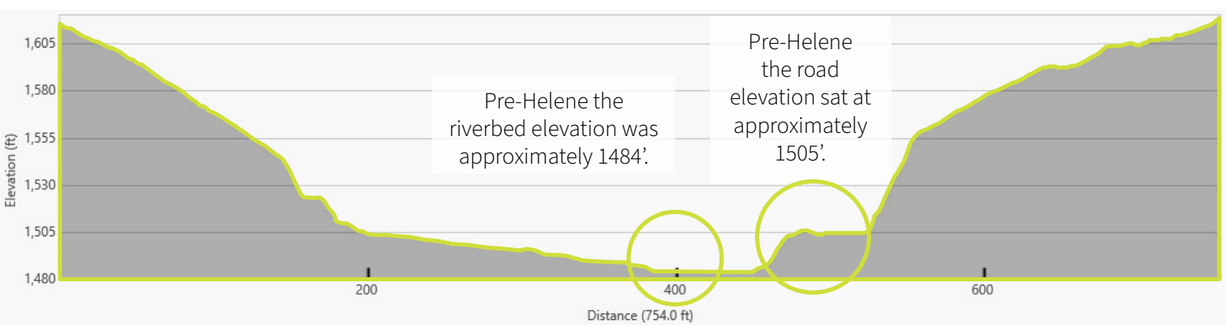
112 Structures Destroyed from Storm - from the damaged structures assessment completed by Henderson County

Patterns Repeated Across the Gorge

These before and after images provide a glimpse of the destruction and impacts that occurred across the Gorge during Helene. Landslides and debris flows on steep slopes deposited sediment and other debris along the riverbeds through the area, this can be seen in the blue areas in the right-hand image below. Meanwhile, the high water levels and combined water velocity carved out the land along the base of the gorge, destroying existing infrastructure that was in the path of the flows, as seen in the red areas of the right-hand image below. Overall, these impacts resulted in drastic changes to the landscape of the Hickory Nut Gorge.

Before

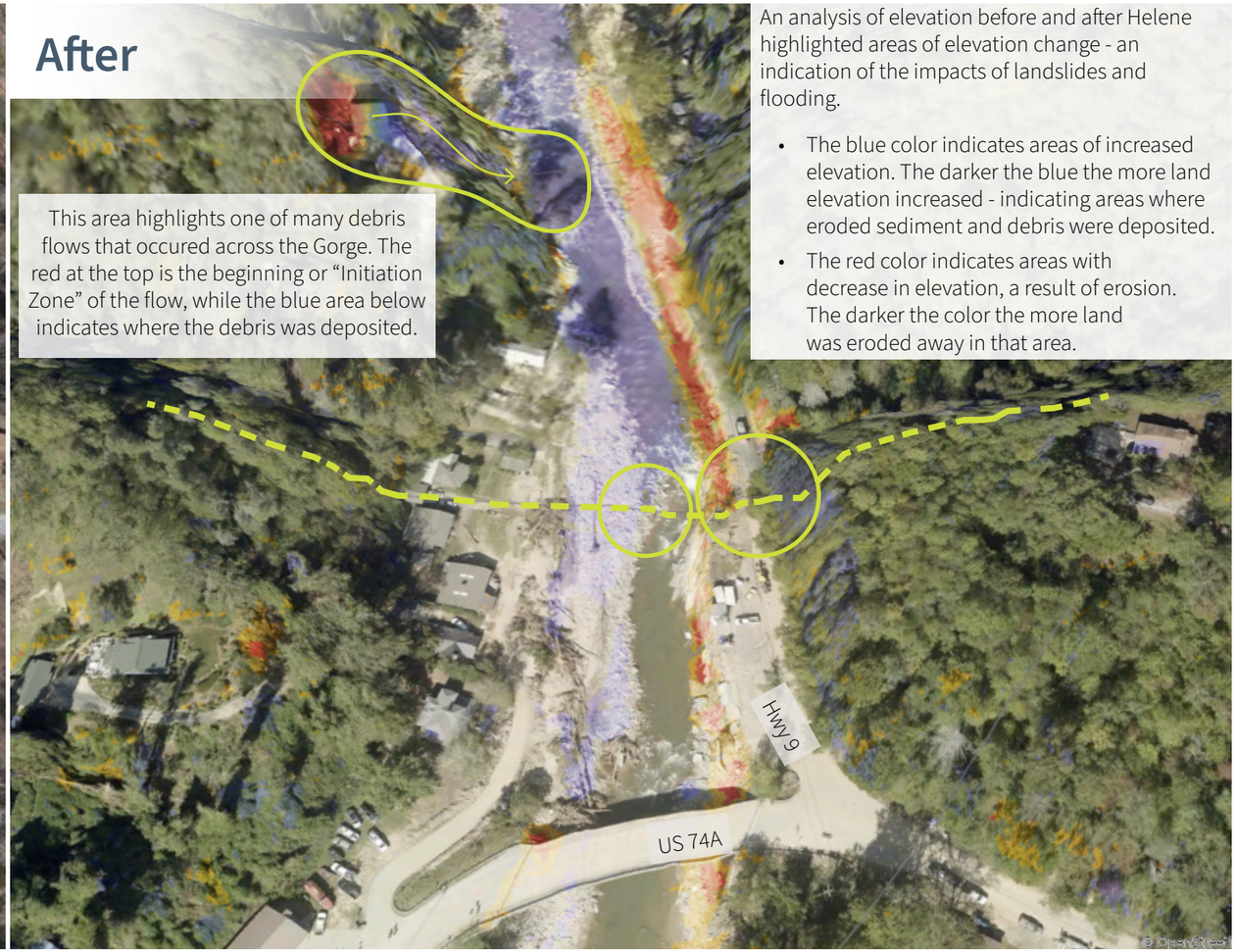




Pre-Helene the riverbed elevation was approximately 1484'.

Pre-Helene the road elevation sat at approximately 1505'.

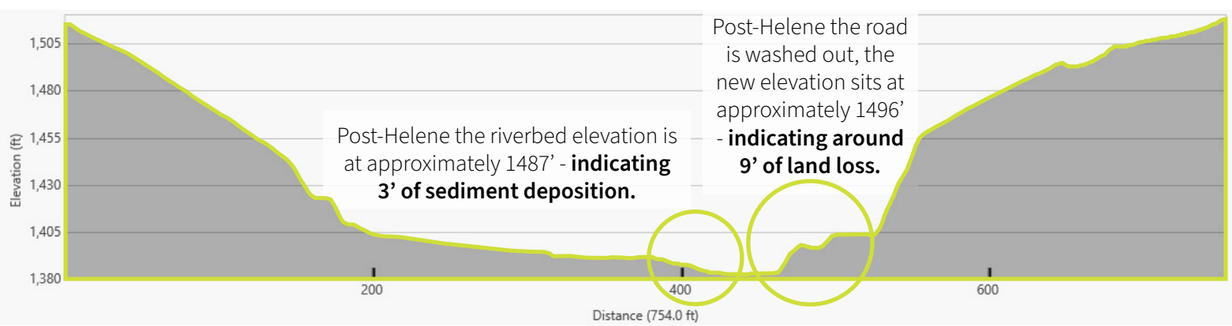
After



This area highlights one of many debris flows that occured across the Gorge. The red at the top is the beginning or "Initiation Zone" of the flow, while the blue area below indicates where the debris was deposited.

An analysis of elevation before and after Helene highlighted areas of elevation change - an indication of the impacts of landslides and flooding.

- The blue color indicates areas of increased elevation. The darker the blue the more land elevation increased - indicating areas where eroded sediment and debris were deposited.
- The red color indicates areas with decrease in elevation, a result of erosion. The darker the color the more land was eroded away in that area.



Post-Helene the riverbed elevation is at approximately 1487' - **indicating 3' of sediment deposition.**

Post-Helene the road is washed out, the new elevation sits at approximately 1496' - **indicating around 9' of land loss.**

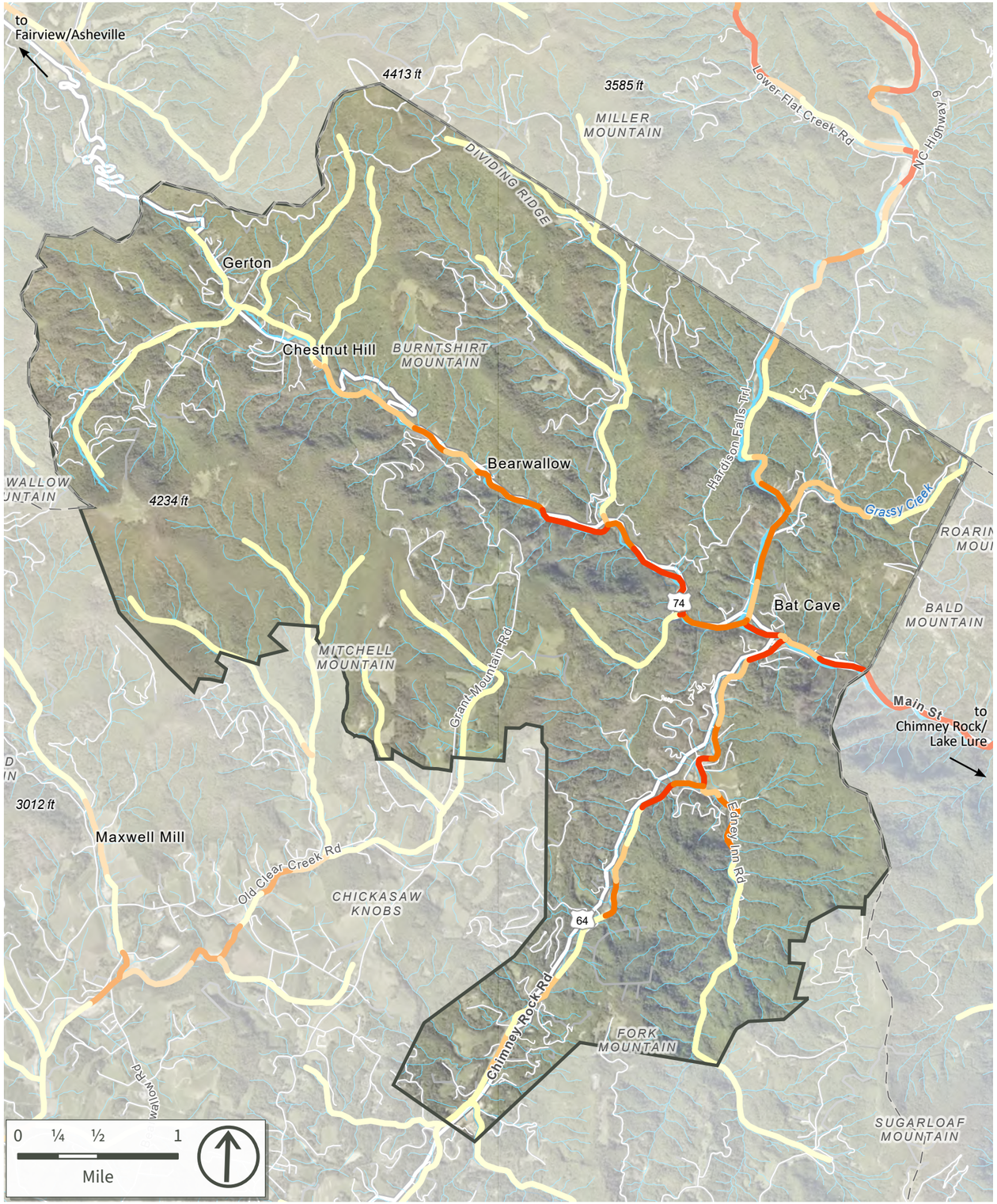
Riparian Zone Change Map

Stream and flood management has largely focused solely on water: where it is expected to move during a flood and how to avoid or mitigate flooding through engineering means. However, streams transport more than just water. Streams also gather, store, and move sediment and debris. Most of the time these processes are hardly noticeable but sometimes, especially during a flood event, erosion and deposition can happen rapidly, resulting in movement of the stream channel into new locations, bank retreat, and hill slope failures. This dynamism is the natural way that streams function. The resulting landscapes created by moving streams, scientists have found, have a positive impact on the ecology and function of a stream corridor through the creation of new channels, wetlands, and riparian habitats.

A Fluvial Hazard Zone (FHZ) is defined as the area a stream has occupied in recent history, may occupy, or may physically influence as the stream stores and transports water, sediment, and debris. Streams become hazardous when public infrastructure, houses, businesses, and other investments are built in areas where fluvial processes — the natural erosion, transport, and deposition of sediment by flowing rivers and streams — occur. Riparian zones are the areas of vegetation surrounding stream systems. These zones contribute to fluvial processes in a variety of ways. The vegetation stabilizes soil, reduces scouring of banks during flood events, and contributes to stream channel stabilization, while also functioning as a buffer for the stream channel by trapping sediment and other pollutants.

To address the unrecognized hazards associated with riparian zone degradation, erosion, sediment deposition and other dynamic stream processes, we need to identify and map the hazards posed by these natural stream processes and develop tools to help communities and landowners better understand the hazards associated with flood events.

This map illustrates changes in the landform and vegetation loss within the riparian corridor of some of the larger streams and rivers within HNG. Riparian corridors are important components of a FHZ because they enhance water quality by filtering runoff and stabilizing banks, provide vital habitat and corridors for diverse wildlife, off er crucial shade and thermal regulation for aquatic ecosystems, and support human recreation and economic benefits through flood control and increased property values. These dynamic zones, where land meets water, are essential for maintaining healthy, functional freshwater ecosystems and supporting both wildlife and human communities



Planning Area Boundary

Riparian Zone Tree Canopy Damage

- Major
- Moderate
- Minor
- Little to None

Forest Damage Map

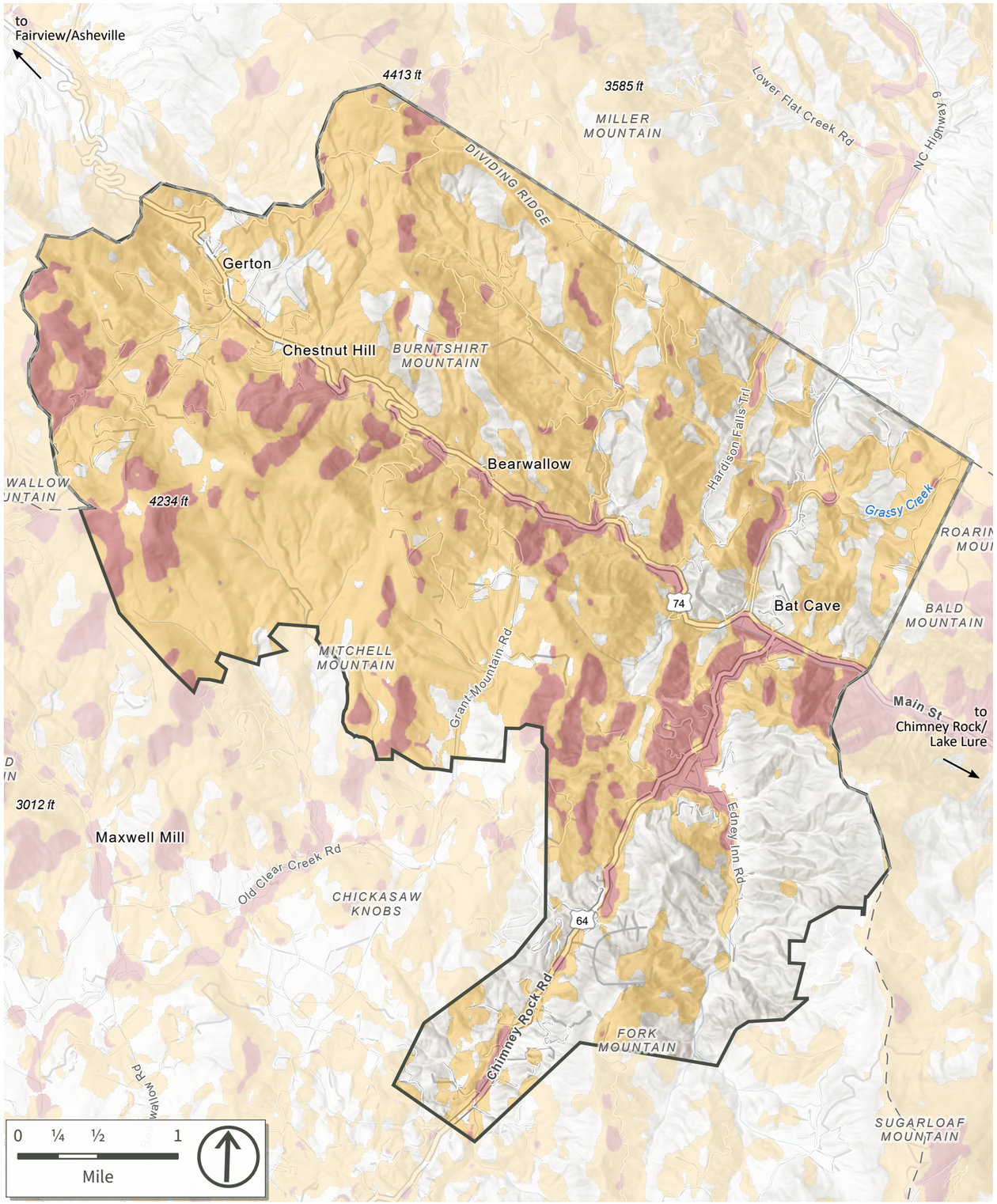
This map was derived from remote sensing data collected by satellite to assess forest damage related to Helene. Damage was related to both geomorphological impacts (e.g., landslides, scouring of forested floodplains) and wind impact that caused structural tree and crown damage, and leaf stripping.

Class 1 “severe” represents heavy blowdown with patchy to complete canopy loss most of the time.

Class 2 “possible” includes an irregular mix of leaf stripping and structural tree damage and is less reliable and more ambiguous given the limitations of fall assessment.

Class 3 “None/minor” shows areas with minor, spotty or no visible canopy change.

This map is important to highlight areas of concentrated disturbance from Helene. Areas with more damage have an increased wildfire risk, particularly on south and southwest facing slopes. It helps with recovery considerations by providing data on what areas of the gorge may need more attention in the recovery effort. For instance, areas in need of forest management or wildfire management can be determined from this map.

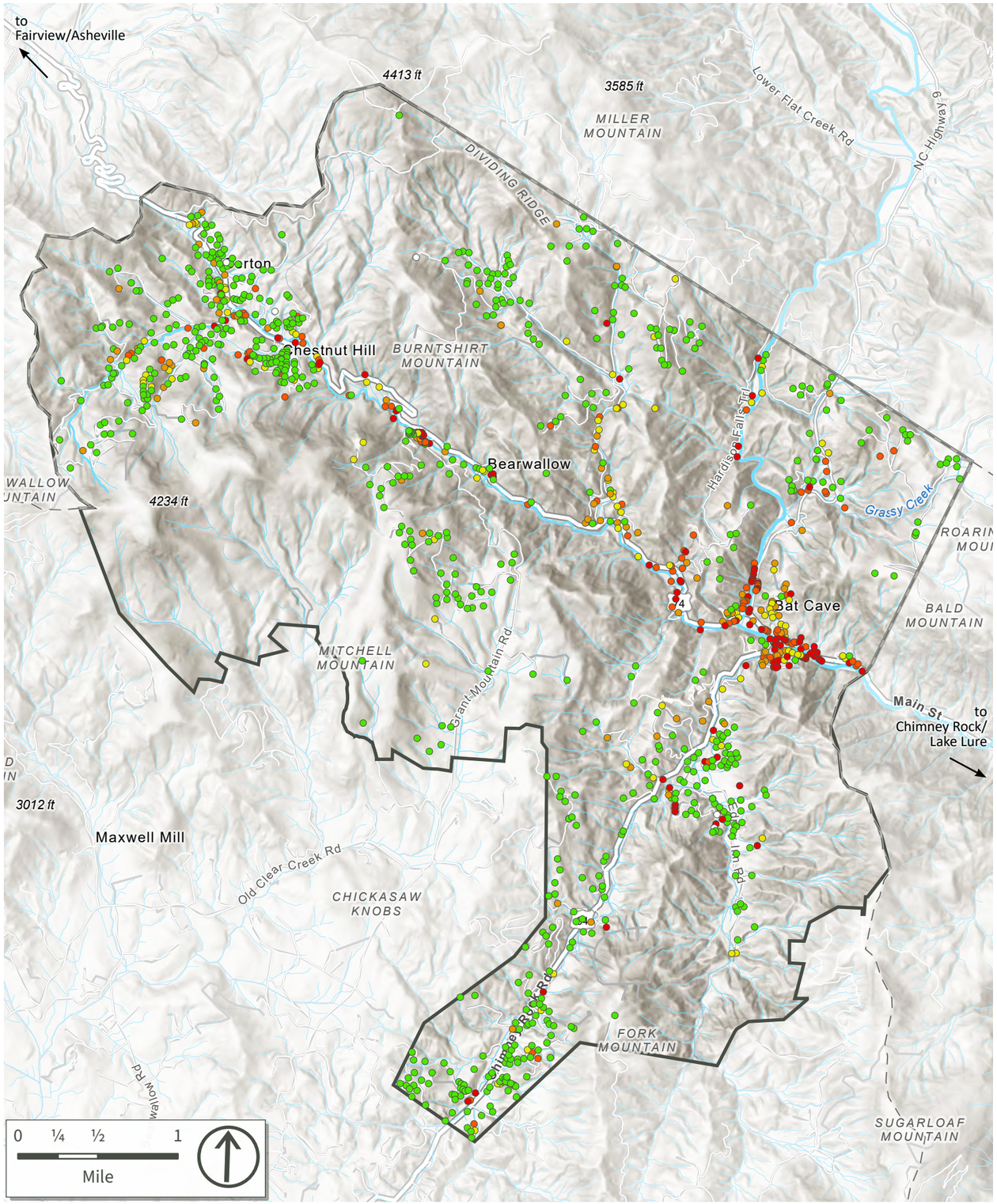


Planning Area Boundary

Forest Damage Post-Helene:

- Class 1 - Severe Damage
- Class 2 - Possible Damage
- Class 3 - None/Minor Damage

Structure Damage Assessment Map



This point data represents the on-the-ground structure assessments completed by the North Carolina Emergency (NCEM) Response Team post-Helene from October 3, 2024 to March 30, 2025. Each point represents a single structure, not necessarily a residence, and this inventory is not comprehensive. It shows the structures which the search and rescue teams were able to get to and assess using mobile devices. The categories of damage (i.e. “Major Damage”, “Minor Damage”, “Affected”, etc.) were determined in the field based on observed and reported factors.

Looking at the view of the full planning area, patterns of structure damage are easily observed throughout the area. The damage was caused by an array of factors including flooding, landslides, fallen trees, etc. The Bat Cave area appears to have had the largest concentration of “destroyed” structures. This can be understood in the context of the previous maps which show the amounts of flooding, landslides, and tree damage.

Planning Area Boundary

Structure Damage Assessment:

NC Emergency Management Post-Helene Search & Rescue Assessment:

- Unaffected Structure (684)
- Minor Damage (99)
- Affected (87)
- Major Damage (95)
- Destroyed (112)
- Unknown Status (7)

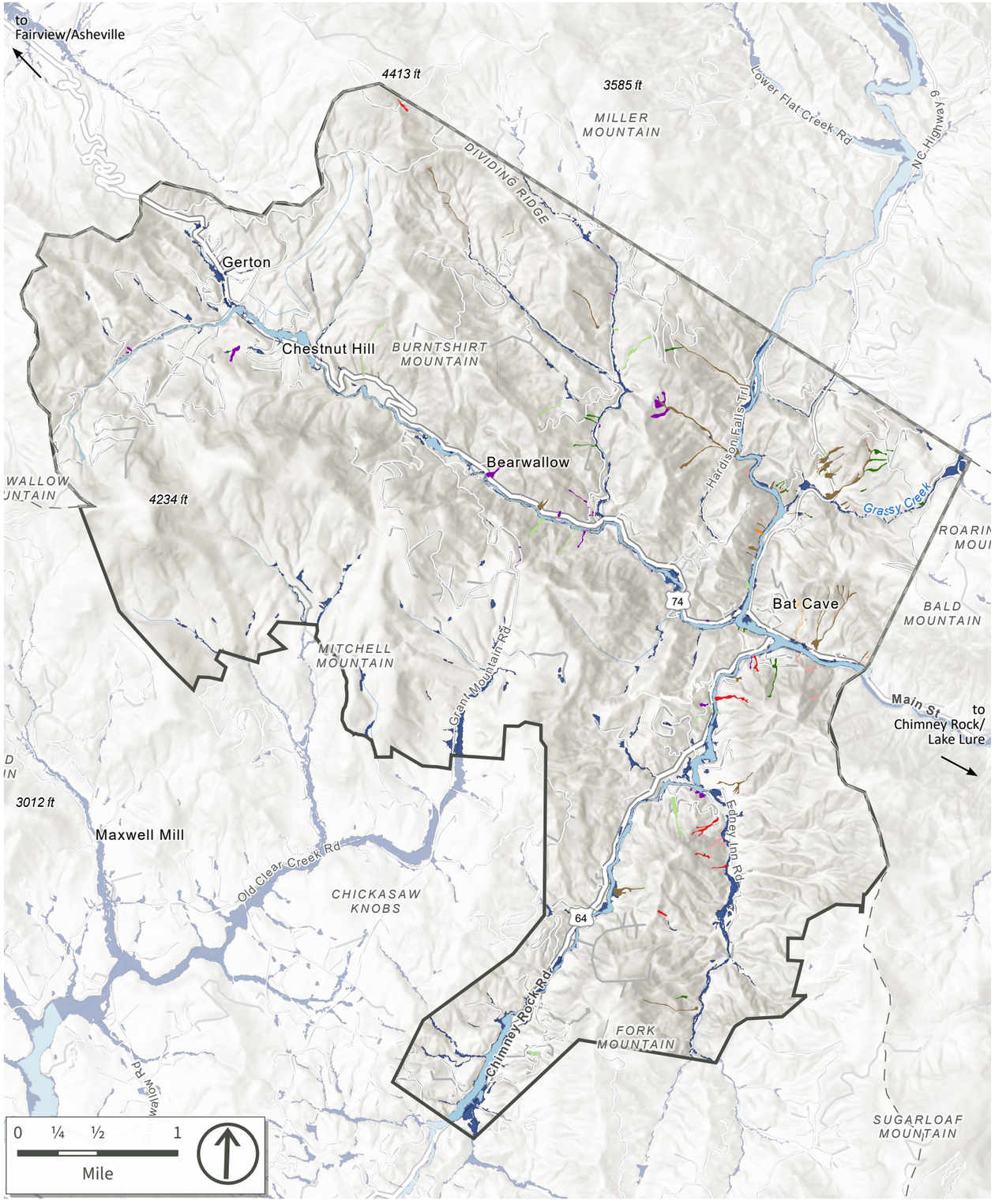
Flood & Landslide Map

Tropical Storm Helene brought unprecedented destruction to the gorge. Record rainfall was funneled into the narrow valleys, turning the Broad River into a cascading fury of mud, rock, and debris. This resulted in 1,500 to 2,000 landslides across Western North Carolina, with hundreds occurring specifically in Hickory Nut Gorge. Communities like Gerton, Bat Cave, and sections of Edneyville were severely impacted, with Lake Lure receiving over a million cubic yards of natural and non-natural debris from upstream communities.

This map illustrates both Federal Emergency Management Agency (FEMA) and non-FEMA flooding. FEMA flood maps provide a regulatory framework to determine flood insurance requirements and land use rules, defining flood zones at a community level based on historical data and riverine flooding. In contrast, the non-FEMA flood map offers a more comprehensive view of risk by illustrating areas likely to be impacted by a “500 year” flood event. While FEMA maps serve as official tools for building codes and insurance, non-FEMA maps provide a more current, nuanced, and forward-looking assessment of flood risk. As we develop the more sophisticated tools for mapping flooding and better understanding the effects of increased rainfall intensities and weather patterns, the mapping should be updated and revised to best reflect risk.

Historically, local governments have regulated stream corridors by relying on Federal Emergency Management Agency (FEMA) Guidance and Standards to create Flood Insurance Rate Maps (FIRMs) which are used to establish insurance premiums through the National Flood Insurance Program (NFIP). These maps are elevation-based, delineating only inundation hazards.. These maps do not consider stream movement, the erosion of stream banks or hillslopes, or the impacts of sediment and debris deposition. As a result, properties located well above mapped floodplain elevations or outside FIRM floodplain boundaries may be affected by flood processes not accounted for in standard floodplain mapping.

The landslide data presented in the map is based on data collected by the North Carolina Geological Survey and its partners. Landslide mapping is done by a mix of desktop analysis using aerial imagery and Lidar derived topography and field work. The color coding of the landslides is based on analysis of comments provided by the landslide assessors. These can be thought of as general categories or themes related to the nature of the landslides and their impact, not necessarily the cause.



- Planning Area Boundary

Landslide Assessment Post-Helene:

Category of Potential Cause:

- Debris Flow (49)
- Cut Slope (31)
- Fill or Embankment (28)
- Road Failure (25)
- Debris Slide (15)
- Mining or Quarrying (12)
- Clear Cutting (4)
- River or Stream Bank Failure (4)
- Other (7)

FEMA Flood Hazard Data:

- 1% Annual Chance Flood Hazard (100-Year Floodplain)

500-Year Flood Area (non-FEMA)

Many of the landslides that occurred initiated in cut slopes, fill, or embankments associated with roads and trails on very steep slopes. These are often high up within the watershed but are also seen lower in the watershed where they are adjacent to Highway 74, 64, and 9 and to Hickory Creek, Reedy Patch Creek, and the Rocky Broad River. Some landslides also appear to have initiated in clear cut areas or areas where non-native invasive species like Oriental Bittersweet (*Celastrus orbiculatus*) and Kudzu (*Pueraria montana var. lobata*) dominate the landscape.

**more detailed breakout maps are provided in appendices*

Analysis Conclusions

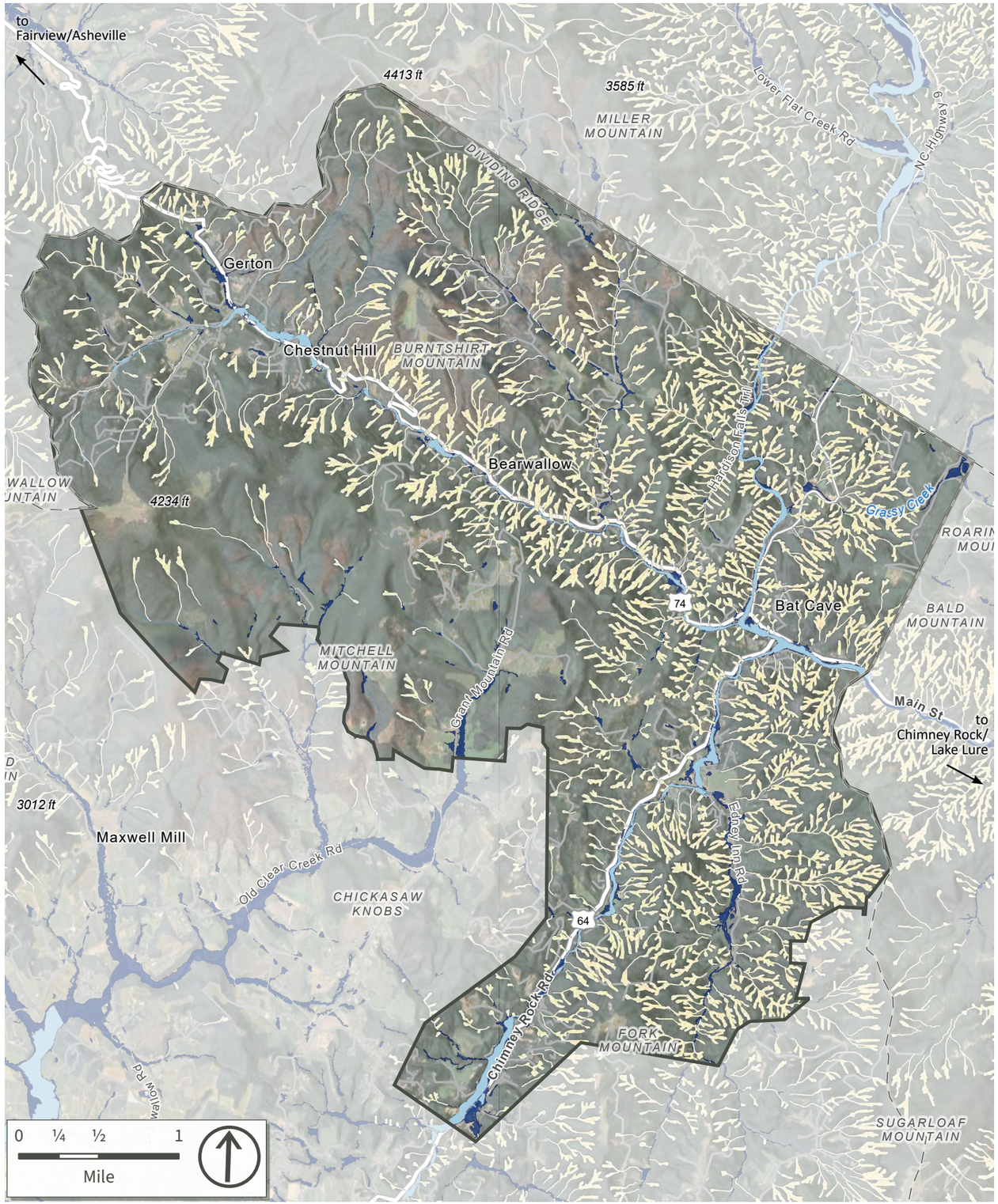
This series of hazard maps aims to delineate areas susceptible to debris flows, illustrate flood inundation zones, and identify regions that may face an increased risk of wildfire. These maps highlight the hazards that should be considered when deciding whether to rebuild, restore, or retreat.

Potential Debris Flow Pathways & Potential Flood Areas Map

The North Carolina Channelized Debris Flow Susceptibility Model layer provided by NC Geological Survey (NCGS) shows areas within Hickory Nut Gorge that could be affected by the initiation and runout of channelized debris flows during a large storm event. These areas are only susceptible during a large storm event (5 inches or more of rain in a 24 hour period or equivalent). This model output highlights places where debris flows—fast-moving mud, rocks, and water—are likely to start and where they could travel. Notably, no attempt is made to model the area beyond the pour point (the most downstream point where a debris flow is predicted to emerge from the drainage or watershed) of the debris flow. This area, down slope from the pour point is where deposition begins and is called the deposit. This is where the majority of destruction occurs from a debris flow, but is unfortunately outside the scope of this model. This model identifies purposely "over predicts" where debris flow pathways may appear to ensure a majority of possible risk is mapped. **Therefore, based on the NCGS model these locations illustrate where debris flow pathways could occur, not just the ones that will occur.**

Flood layers include FEMA's National Flood Hazard Layer "AE". These flood zones are areas that present a 1% annual chance of flooding (commonly referred to as the 100-year flood) and a 26% chance over the life of a 30-year mortgage, according to FEMA. Also included are areas that present a 0.2% annual chance of flooding (commonly referred to as the 500-year flood). It is important to recognize that the "100-year flood" of yesterday may not be the "100-year flood" of today. Changes in the shape and position of the channel, changes in local land use, new river impoundments, changes in the amount of impervious surfaces, and long-term climate patterns can affect at what point a "100-year flood" is designated.

**more detailed breakout maps are provided in appendices*



Planning Area Boundary

NC Channelized Debris Flow Susceptibility Model:

Area More Susceptible During a Storm Event

FEMA Flood Hazard Data:

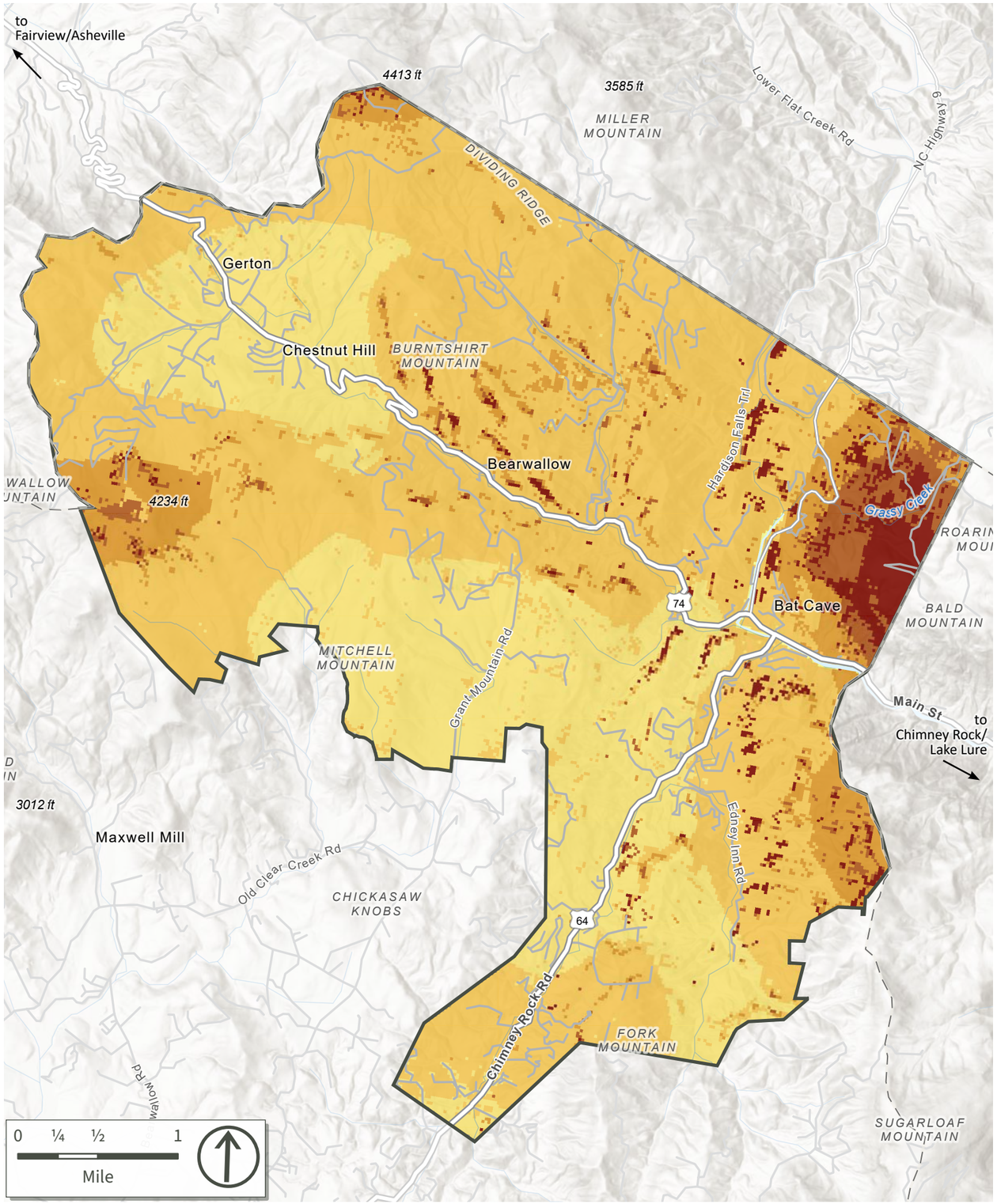
1% Annual Chance Flood Hazard (100-Year Floodplain)

500-Year Flood Area (non-FEMA):

Wildfire Risk to Homes Map

For assessing wildfire risk, the US Department of Agriculture Forest Service (USDA/USFS) Wildire Risk to Communities tool is used here; specifically the Risk to Homes data. Risk to Homes measures the relative consequence of wildfire to residential structures everywhere on the landscape, whether a home actually exists there or not. It poses the hypothetical question, “What would be the relative risk to a house if one existed here?” It asks that question regardless of whether a home actually exists at that location or not. Risk to homes integrates modeled data about wildfire likelihood and intensity with a generalized concept of susceptibility for homes. Risk to homes allows users to consider wildfire risk in places with homes in addition to places where new construction is proposed. According to the USDA/USFS Wildfire Risk to Homes data, homes in Gerton have, on average, a greater risk than 70% of communities in the US and a 100% greater risk than other communities in Henderson County. This data can be explored at https://apps.wildfi rerisk.org/explore/risk-tohomes/37/37089/3700025900/.

Note that fire risk is also associated with access for emergency vehicles. Roads that are blocked due to downed trees that limit emergency vehicles can exacerbate a situation caused by wildfire.



Chapter 3: Community Input on Recovery

"Strangers become friends, and communities come together under extreme pressure. I love this place. I love these people. This is my home, and I will do my part to make it right. God bless us all."
— Jeffrey Boudreaux, HNG Group Member

The Hickory Nut Gorge Recovery Plan was shaped by the voices, values, and experiences of the people who live and work in the Gorge. Community engagement formed the foundation of this effort ensuring that recovery priorities reflect both professional best practices and the lived realities of residents who experienced the impacts of Helene firsthand.

From the outset of the planning process, Henderson County emphasized a collaborative and inclusive process designed to empower local residents and business owners and elevate their top priorities. Engagement activities focused on capturing how residents envision a safer, stronger, and more connected future for the Gorge's communities, Gerton, Bat Cave and a portion of Edneyville.

Through public meetings, a community survey, and interactive mapping and writing prompts, residents shared their observations about storm damage, access and response challenges, housing and business needs, and opportunities to rebuild infrastructure, recreation, and ecosystems more resiliently. Each activity was intentionally designed to meet the community where it was while creating space for hope, creativity, and shared visioning for the future.

Hickory Nut Gorge Group (HNG Group)

In May 2025, the Henderson County Board of Commissioners invited applications from residents, business owners, and property owners within the study area to serve on a Community Partners Group for the Hickory Nut Gorge Land Use Recovery Plan. From 25 applicants, nine community representatives were appointed to the group—known as the HNG Group—along with several ex-officio members whose expertise was vital to the planning process. This volunteer group played an active role in shaping the plan's recommendations before it was presented to the County Commissioners.

The HNG Group's early meetings established the foundation for engagement across the Gorge. Members articulated their experiences of the storm and the ensuing recovery efforts emphasizing safety, empathy, and community connections as guiding factors. These reflections became the basis for a shared purpose.

The HNG Group brought together a diverse coalition of individuals united by a shared commitment to meaningful recovery from Tropical Storm Helene. Drawing on a broad range of strengths, including technical knowledge, conservation expertise, emergency management, communication, analysis, organization, and deep local insight, the group aimed to bridge short-term community needs and long-term recovery solutions. The group's collective capacities, curiosity, empathy, enthusiasm, creativity, connections, and civic engagement enabled them to guide this planning process with integrity, inclusivity, and strategic vision. Together, they were dedicated to shaping a recovery that not only rebuilds what was lost but also lays the foundation for a stronger, more connected, and more resilient future for the communities within the Hickory Nut Gorge.

The Role of the HNG Group

The HNG Group met six times over the course of the six-month planning process. Meetings were held in person at the Henderson County offices, because internet access within the Gorge remained unreliable following the storm. During each session, the consultant team engaged the group for feedback on key topics ranging from land use and infrastructure recovery to communication, emergency management, and community priorities.

In addition to providing direct input, members of the HNG Group served as vital liaisons to their communities—helping to distribute information about the planning process, share the community survey, and promote announcements from the County. They also participated in both public meetings and conducted detailed reviews of the draft plan materials.

Their guidance was instrumental in grounding the plan's recommendations in local knowledge and ensuring the recommendations reflected real community needs and were both feasible and actionable. Through their consistent involvement, the HNG Group helped create a plan that authentically represents the voices and aspirations of the Hickory Nut Gorge community.

Emerging Themes from the HNG Group

- **Emergency Management:** Both fire departments were critical community hubs. Recovery can look like strengthening these services and their physical structures so they can continue to offer essential services.
- **Identity and Stewardship:** Recovery must protect the Gorge's natural character and small-town feel.
- **Resilient Infrastructure:** Roads, bridges, utilities, and waste management systems should be rebuilt to withstand future storms while improving safety and connectivity.
- **Ecological Restoration:** River and stream restoration, reforestation, and slope stabilization are essential to long-term resilience.
- **Community Wellbeing:** Recovery must address housing affordability and social services to support existing and displaced residents
- **Adaptive Reuse and Recreation:** Buyout properties and flood-prone areas should be restored to natural function or converted into passive recreation and education spaces, and coordinated across county lines. Emergency access should be integrated into new recreation infrastructure.

Community Involvement

Community Stories

The HNG Group was invited to share written or recorded narratives describing their experiences during and after the storm, with the understanding that these stories would serve both as part of the historical record and as inspiration for the plan. These stories are included in the plan's appendices. The individual testimonies reflect the resilience, grief, and determination that define the Gorge's recovery journey and the people at the heart of this experience.

Community Survey

In July 2025, the County launched an online and paper survey to gather input from residents, property owners, and workers throughout the Gorge. The survey captured broad perspectives on recovery priorities, community identity, and long-term needs. Participants emphasized rebuilding roads and bridges to higher standards, improving emergency access, supporting local businesses, restoring natural resources, and maintaining the Gorge's rural character.

Public Meeting 1 - Listening & Learning

Held in August 2025, the first public meeting was intentionally structured as a space to listen, learn, and honor the community's experiences. More than one hundred participants attended the event, which began with a brief presentation by County staff and Equinox outlining the purpose of the plan and the commitment to a community-driven process.

The meeting featured five interactive stations designed to engage participants in identifying priorities on enlarged maps and sharing "Big Thoughts for Recovery" and opportunities for long-term recovery. A facilitated listening session offered space for personal storytelling, supported by a trauma-informed facilitator and therapist.

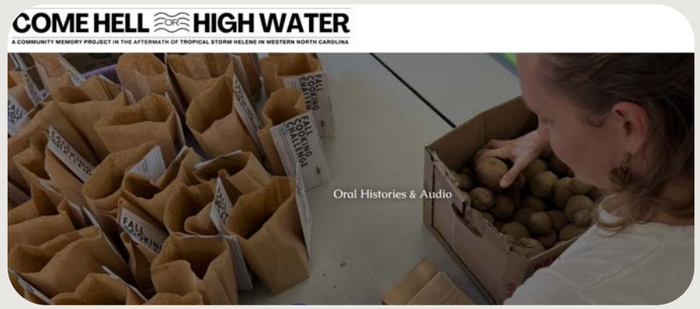
"Recovery to me means an opportunity to create something even better."

— Marjery Sherill, Local Resident

Additionally, the County invited the Come Hell or High Water Community Memory Project to attend and document stories in real-time. This collaboration marked the first inclusion of Henderson County residents from Bat Cave that were represented in the western North Carolina historical archive. To listen to the accounts of John Anderson and Gerry Lynam, visit www.helenehistory.omeka.net/ and search Bat Cave. Overall, the public meeting offered a much-needed sense of hope that progress was being made to advance recovery efforts and move forward.

What is the Come Hell or High Water Community Memory Project?

Come Hell or High Water is a community memory project to collect, preserve, and present the stories and digital record of the Western North Carolina communities impacted by Tropical Storm Helene. They hope to create a pathway for community reflection, healing, and long-term development of community memory not afforded victims of past disasters (like the Great Flood of 1916).



Public Meeting 2 - Prioritizing Recommendations

The County held a follow up public meeting in November 2025 where participants reviewed and prioritized the draft recommendations developed from the earlier rounds of public feedback. The project recommendations were divided into eight recovery themes and represented at different stations. Residents visited each station and placed dots on their top projects.

The final station represented a comprehensive overview of all the recommendations. Here, residents had the opportunity to choose their top three projects. The outcome of this process helped the County prioritize projects for implementation, align funding mechanisms, and mobilize key staff and partners to get the work done.

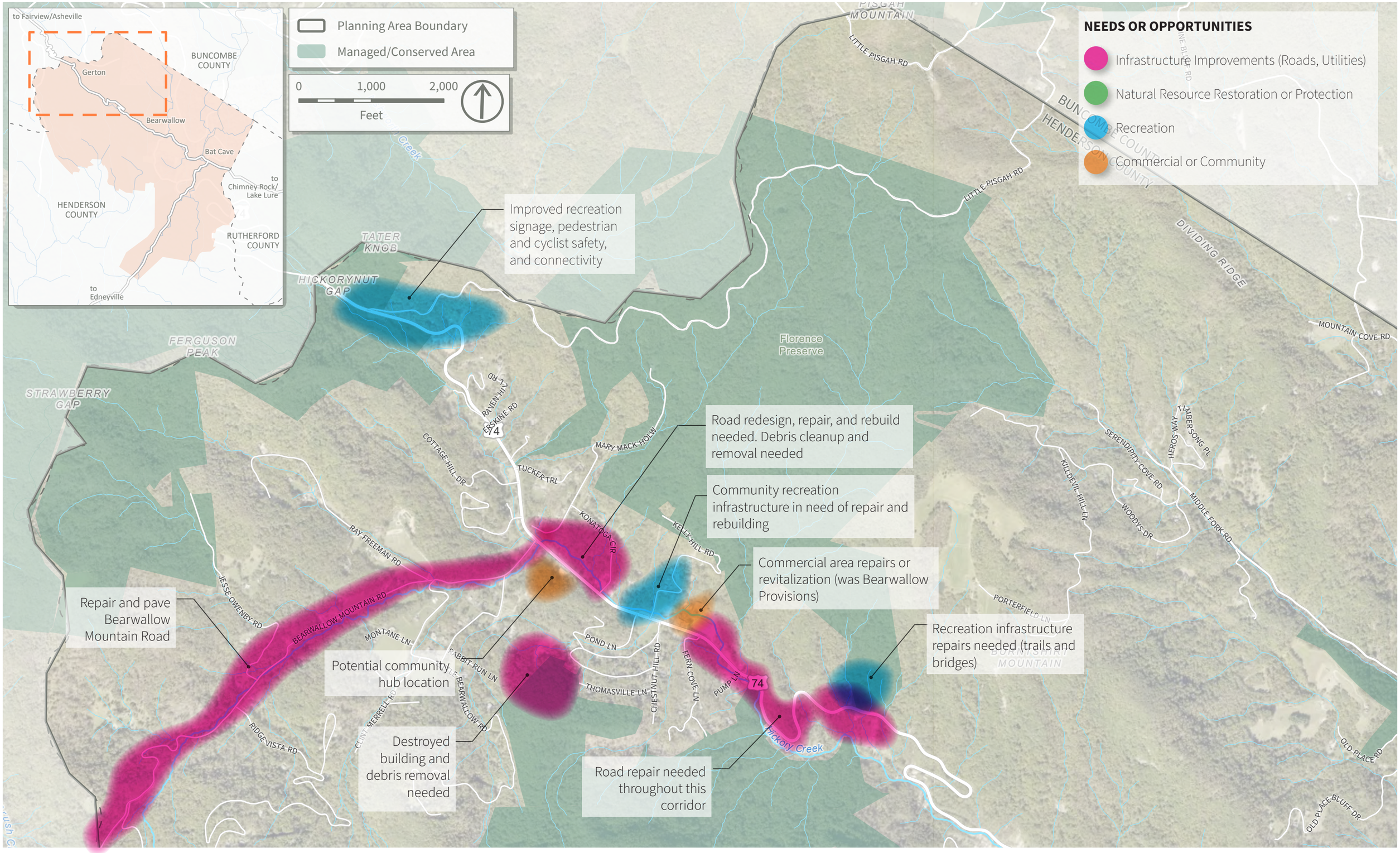
Going Forward

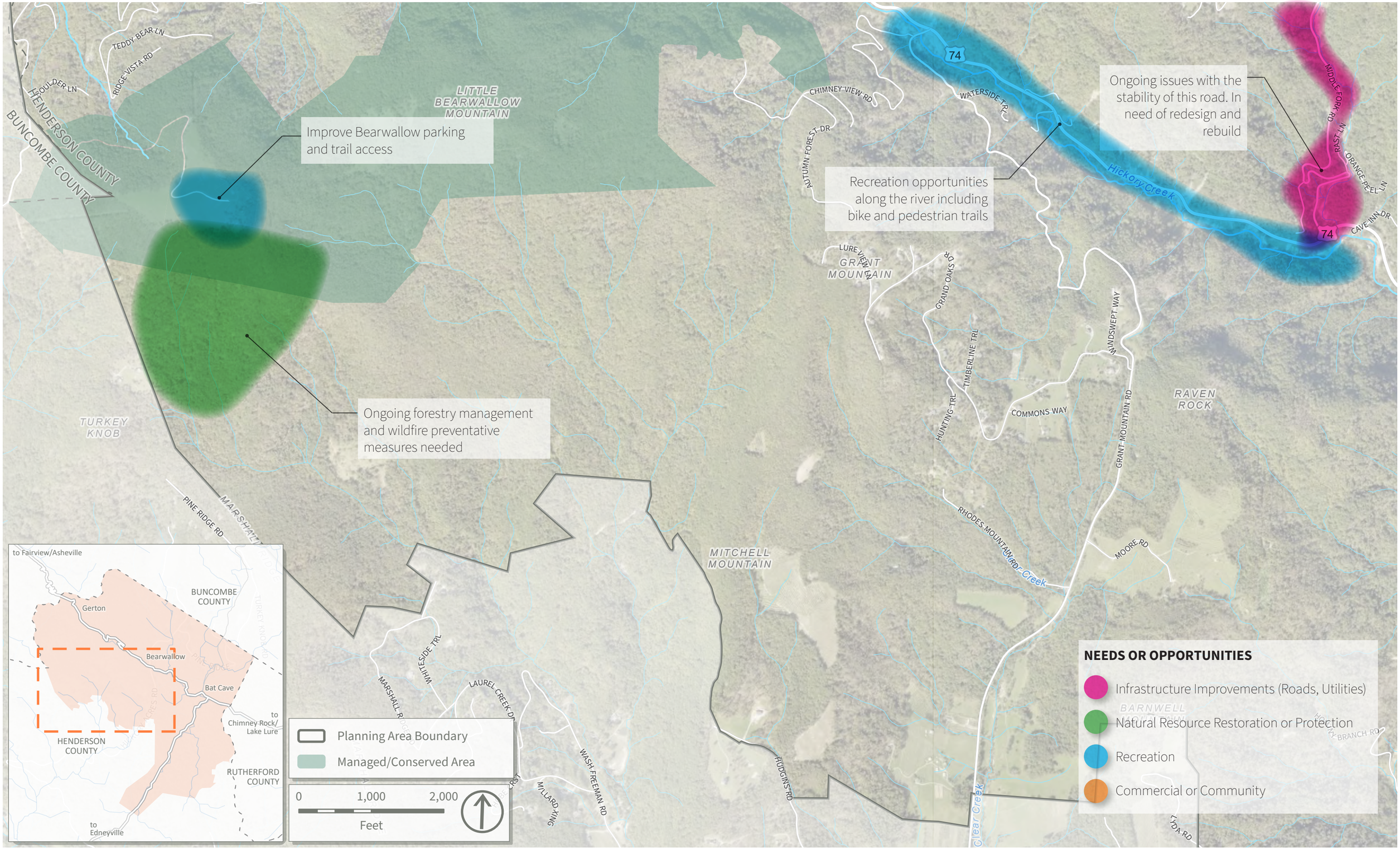
The community engagement activities built a foundation of trust, inclusiveness, and shared purpose. This process empowered residents to shape the recovery plan through direct participation ensuring that recommendations reflect community priorities and the lived experience of people in the Gorge. The result is a community-driven blueprint for recovery that charts a path forward for the next ten years and beyond.

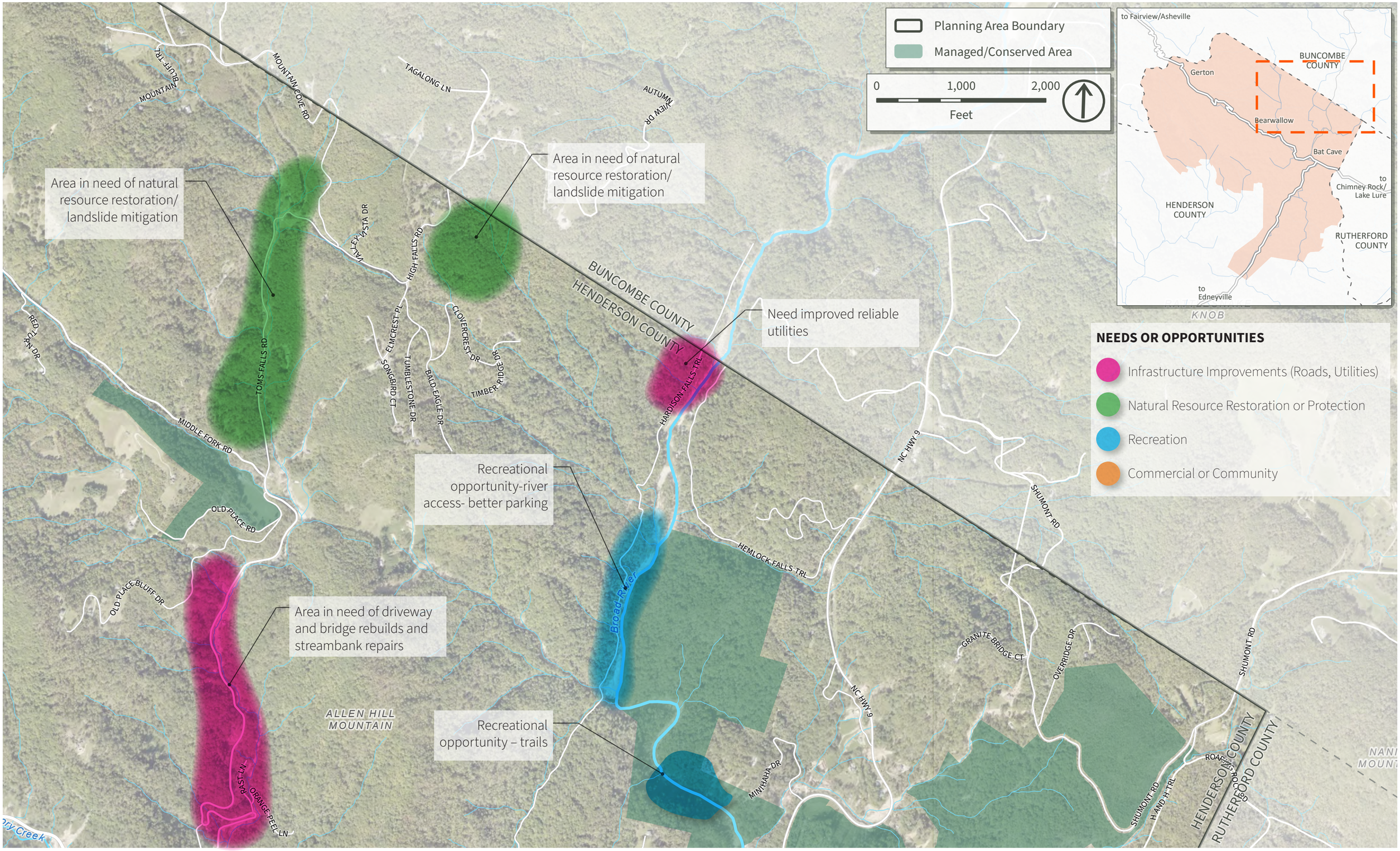
Looking ahead, the continued involvement of the HNG Group working with Henderson County staff will be essential to turning the recovery plan's recommendations into action. As trusted community representatives, their ongoing participation can serve as the driving force—connecting local voices, county leadership, and partner organizations to move projects from planning to implementation. By maintaining communication between residents and agencies, identifying opportunities for collaboration, and helping to prioritize actions on the ground, the HNG Group can ensure that the momentum built during this planning process is carried forward. Their commitment, insight, and local leadership will be the catalyst that transforms the plan's vision into meaningful recovery and long-term resilience for the Hickory Nut Gorge.

Heat Maps:

The following pages show heat maps that were compiled from the feedback the community gave during the first public meeting. They are color-coded heat maps based on major recovery themes. The areas represented by color depict high concentrations of public feedback and elevate key concerns and opportunities expressed by the public. This data provided foundational information to guide recommendations for locations in the Gorge.


to Fairview/Asheville
BUNCOMBE COUNTY
Gerton
Bearwallow
Bat Cave
to Chimney Rock/ Lake Lure
HENDERSON COUNTY
RUTHERFORD COUNTY
to Edneyville
Planning Area Boundary
Managed/Conserved Area
0
1,000
2,000
Feet
NEEDS OR OPPORTUNITIES
Infrastructure Improvements (Roads, Utilities)
Natural Resource Restoration or Protection
Recreation
Commercial or Community
Improved recreation signage, pedestrian and cyclist safety, and connectivity
Road redesign, repair, and rebuild needed. Debris cleanup and removal needed
Community recreation infrastructure in need of repair and rebuilding
Commercial area repairs or revitalization (was Bearwallow Provisions)
Recreation infrastructure repairs needed (trails and bridges)
Repair and pave Bearwallow Mountain Road
Potential community hub location
Destroyed building and debris removal needed
Road repair needed throughout this corridor
PISGAH MOUNTAIN
LITTLE PISGAH RD
BUNCOMBE COUNTY
HENDERSON COUNTY
DIVIDING RIDGE
MOUNTAIN COVE RD
TATER KNOB
HICKORYNUT GAP
FERGUSON PEAK
STRAWBERRY GAP
Florence Preserve
RAVEN HILL RD
ERSKINE RD
74
COTTAGE HILL DR
TUCKER TRL
MARY MACK HOLW
KONATOGA CIR
KELLY HILL RD
RAY FREEMAN RD
JESSE OWENBY RD
BEARWALLOW MOUNTAIN RD
MONTANE LN
RABBIT RUN LN
POND LN
THOMASVILLE LN
CHESTNUT HILL RD
FERN COVE LN
PUMP LN
CLINT MERRELL RD
E BEARWALLOW RD
RIDGE VISTA RD
Hickory Creek
KILLDEVIL HILL LN
SERENDIPITY COVE RD
WOODYS DR
MIDDLE FORK RD
PORTERFIELD LN
OLD PLACE RD
OLD PLACE BLUFF DR


Improve Bearwallow parking and trail access
Ongoing forestry management and wildfire preventative measures needed
Ongoing issues with the stability of this road. In need of redesign and rebuild
Recreation opportunities along the river including bike and pedestrian trails
LITTLE BEARWALLOW MOUNTAIN
BUNCOMBE COUNTY
HENDERSON COUNTY
TURKEY KNOB
MITCHELL MOUNTAIN
GRANT MOUNTAIN
RAVEN ROCK
BARNWELL MOUNTAIN
Hickory Creek
Clear Creek
TEDDY BEAR LN
RIDGE VISTA RD
BOULDER LN
CHIMNEY VIEW RD
AUTUMN FOREST DR
WATERSIDE TRL
MIDDLE FORK RD
EAST MT
ORANGE PEEL LN
CAVE INN DR
LURE VIEW LN
GRAND OAKS DR
TIMBERLINE TRL
WINDSWEPT WAY
HUNTING TRL
COMMONS WAY
GRANT MOUNTAIN RD
PINE RIDGE RD
MARSHALL RIDGE RD
WHITESIDE TRL
LAUREL CREEK DR
MILLARD KING
WASH FREEMAN RD
HUDGINS RD
RHODES MOUNTAIN RD
MOORE RD
IDA RD
BRANCH RD
74
to Fairview/Asheville
BUNCOMBE COUNTY
Gerton
Bearwallow
Bat Cave
to Chimney Rock/ Lake Lure
HENDERSON COUNTY
RUTHERFORD COUNTY
to Edneyville
Planning Area Boundary
Managed/Conserved Area
0
1,000
2,000
Feet
NEEDS OR OPPORTUNITIES
Infrastructure Improvements (Roads, Utilities)
Natural Resource Restoration or Protection
Recreation
Commercial or Community


Planning Area Boundary
Managed/Conserved Area
0
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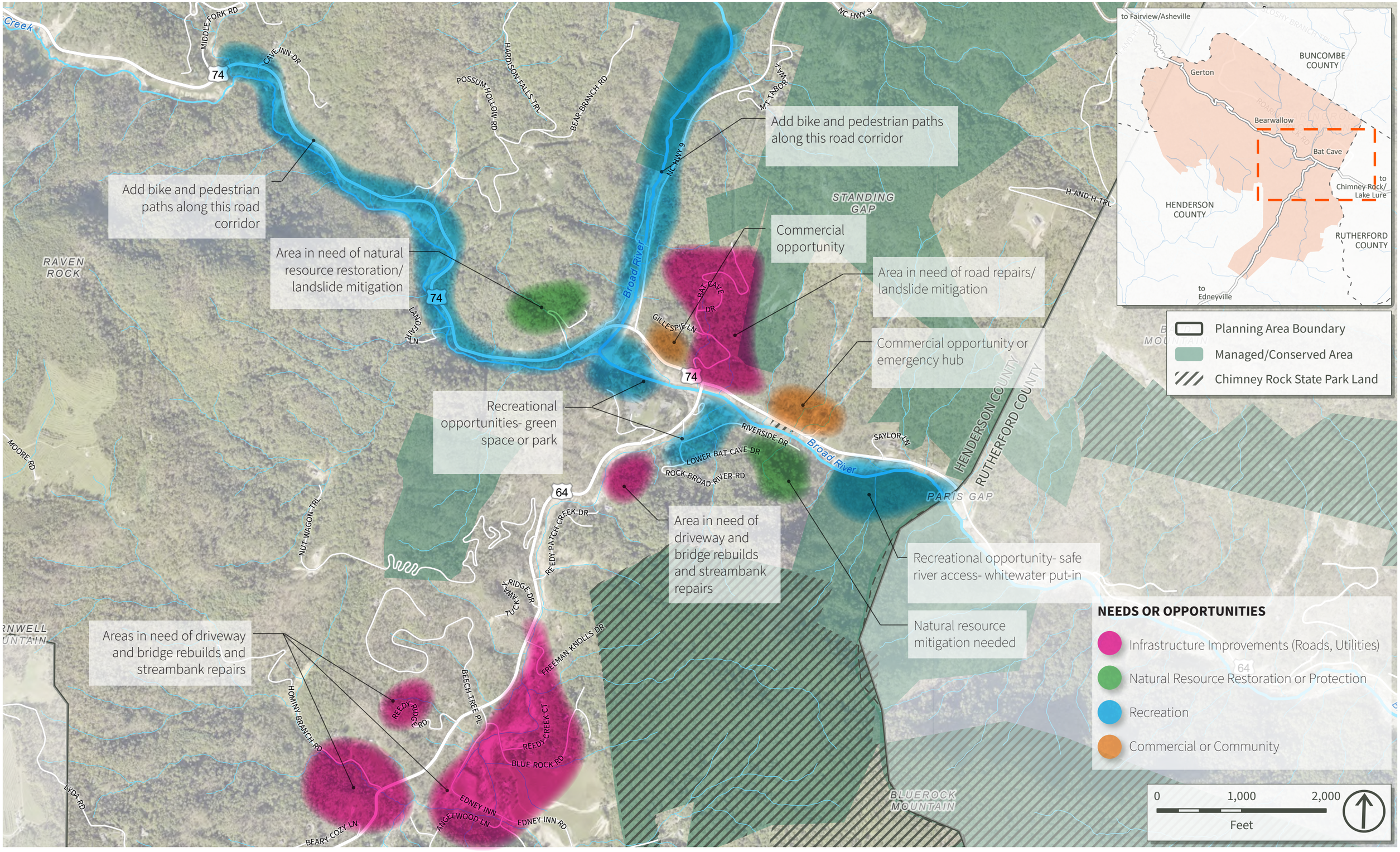
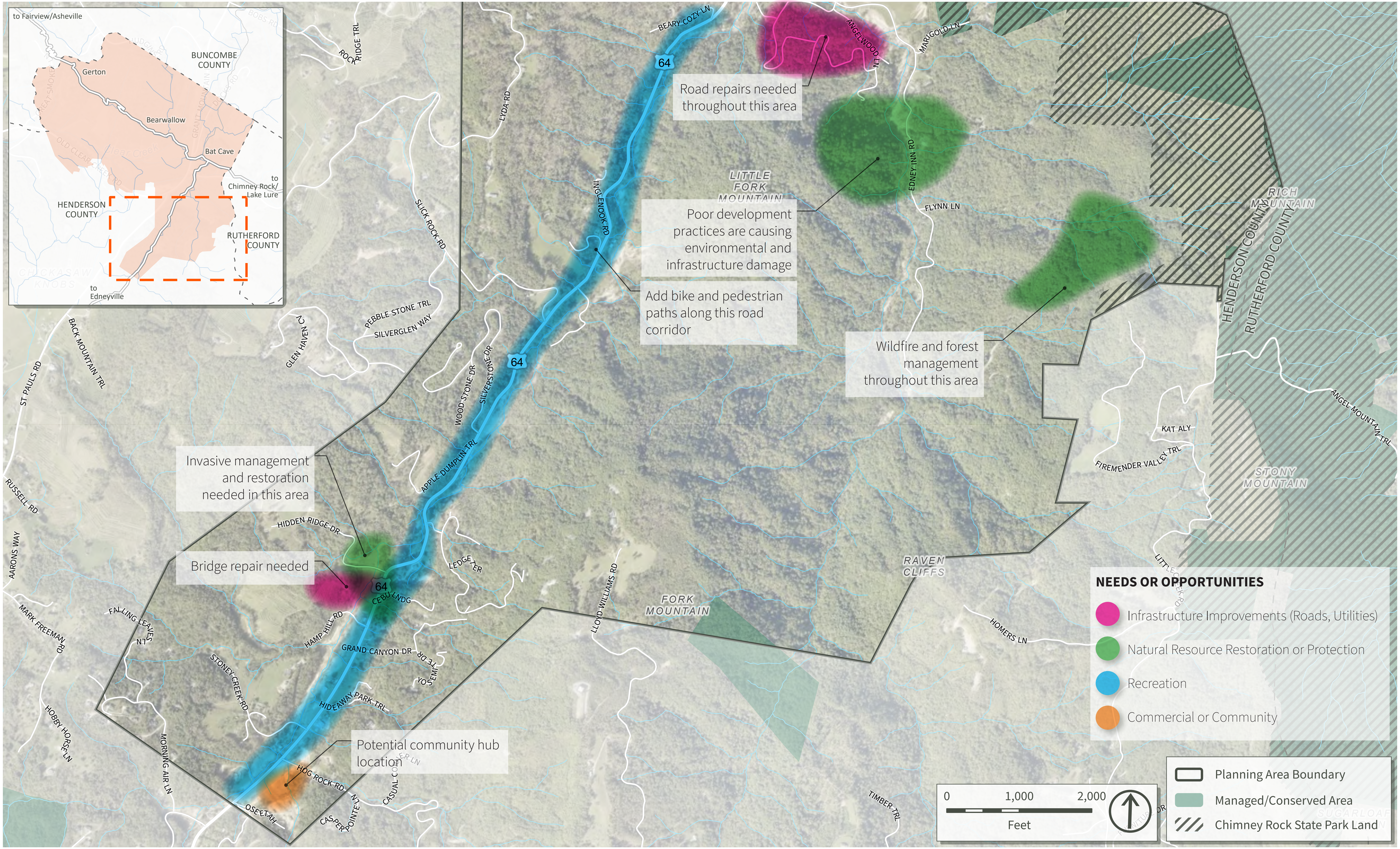
Feet
to Fairview/Asheville
BUNCOMBE COUNTY
Gerton
Bearwallow
Bat Cave
to Chimney Rock/ Lake Lure
HENDERSON COUNTY
RUTHERFORD COUNTY
to Edneyville
KNOB
NEEDS OR OPPORTUNITIES
Infrastructure Improvements (Roads, Utilities)
Natural Resource Restoration or Protection
Recreation
Commercial or Community
Area in need of natural resource restoration/ landslide mitigation
Area in need of natural resource restoration/ landslide mitigation
Need improved reliable utilities
Recreational opportunity-river access- better parking
Area in need of driveway and bridge rebuilds and streambank repairs
Recreational opportunity – trails
BUNCOMBE COUNTY
HENDERSON COUNTY
MOUNTAIN COVE RD
TAGALONG LN
AUTUMN VIEW DR
BLUFF TRL
MOUNTAIN
VALLEY VISTA DR
HIGH FALLS RD
ELMCREST PL
SONGBIRD CT
TUMBLESTONE DR
BALD EAGLE DR
CLOVERCREST DR
TIMBER RIDGE DR
HARDISON FALLS TRL
NC HWY 9
SHUMONT RD
RED CLAY DR
TOMS FALLS RD
MIDDLE FORK RD
OLD PLACE RD
OLD PLACE BLUFF DR
PAST ORANGE PEEL LN
Broad River
HEMLOCK FALLS TRL
GRANITE BRIDGE CT
OVERRIDGE DR
MINNEHAHA DR
ROARING FORK RD
H AND H TRL
ALLEN HILL MOUNTAIN


Add bike and pedestrian paths along this road corridor
Area in need of natural resource restoration/ landslide mitigation
Recreational opportunities- green space or park
Add bike and pedestrian paths along this road corridor
Commercial opportunity
Area in need of road repairs/ landslide mitigation
Commercial opportunity or emergency hub
Area in need of driveway and bridge rebuilds and streambank repairs
Recreational opportunity- safe river access- whitewater put-in
Natural resource mitigation needed
Areas in need of driveway and bridge rebuilds and streambank repairs
to Fairview/Asheville
BUNCOMBE COUNTY
Gerton
Bearwallow
Bat Cave
to Chimney Rock/ Lake Lure
HENDERSON COUNTY
RUTHERFORD COUNTY
to Edneyville
Planning Area Boundary
Managed/Conserved Area
Chimney Rock State Park Land
NEEDS OR OPPORTUNITIES
Infrastructure Improvements (Roads, Utilities)
Natural Resource Restoration or Protection
Recreation
Commercial or Community
0
1,000
2,000
Feet
Broad River
RAVEN ROCK
STANDING GAP
PARIS GAP
BLUEROCK MOUNTAIN
MIDDLE FORK RD
CAVE INN DR
POSSUM HOLLOW RD
HARDISON FALLS TRL
BEAR BRANCH RD
NC HWY 9
MT TABOR RD
H AND H TRL
BAT CAVE DR
GILLESPIE LN
LANGFAIR LN
RIVERSIDE DR
LOWER BAT CAVE DR
ROCK-BROAD RIVER RD
SAYLOR LN
MOORE RD
NUT WAGON TRL
REEDY PATCH CREEK DR
RIDGE DR
CT
FREEMAN KNOLLS DR
BEECH TREE PL
REEDY CREEK CT
BLUE ROCK RD
REEDY ROCK RD
HOMINY BRANCH RD
LYDA RD
BEARY COZY LN
EDNEY INN
ANGELWOOD LN
EDNEY INN RD
74
64


Road repairs needed throughout this area
Poor development practices are causing environmental and infrastructure damage
Add bike and pedestrian paths along this road corridor
Wildfire and forest management throughout this area
Invasive management and restoration needed in this area
Bridge repair needed
Potential community hub location
NEEDS OR OPPORTUNITIES
Infrastructure Improvements (Roads, Utilities)
Natural Resource Restoration or Protection
Recreation
Commercial or Community
Planning Area Boundary
Managed/Conserved Area
Chimney Rock State Park Land
0
1,000
2,000
Feet
LITTLE FORK MOUNTAIN
RICH MOUNTAIN
STONY MOUNTAIN
RAVEN CLIFFS
FORK MOUNTAIN
HENDERSON COUNTY
RUTHERFORD COUNTY
64
to Fairview/Asheville
BUNCOMBE COUNTY
Gerton
Bearwallow
Bat Cave
to Chimney Rock/ Lake Lure
HENDERSON COUNTY
RUTHERFORD COUNTY
to Edneyville

Community Engagement

Public Survey Results

An online community survey was conducted in the Summer of 2025 by Henderson County. The survey was shared on the Henderson County website, and access links were distributed via a mailing to all residents of the Gorge in Henderson County, as well as presented on flyers that were distributed in various localities throughout the community. The survey was also available for attendees to complete at the community meeting held on August 19, 2025. Below is a summary of the results of this survey.

BY THE NUMBERS

180 *Respondents*

70 % *Full-time residents*

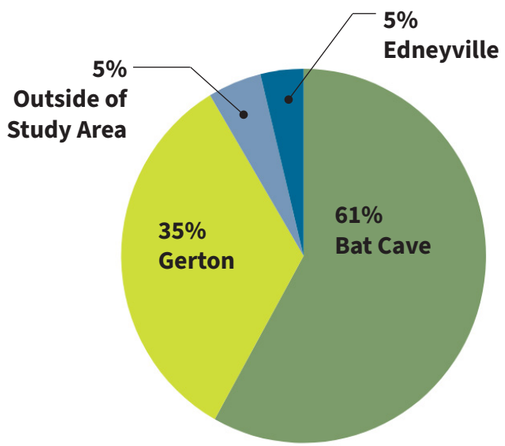
16 % *Part-time residents*

10 % *Business owners*

49 % *Property owners*

14 % *Work or volunteer locally*

What communities do respondents identify with



What respondents say were the biggest impacts within two weeks after Helene (Top 5)

1. ***Damage to private roads/driveways/bridges***
2. ***Limited access to roads/transportation***
3. ***Loss of community spaces***
4. ***Damage to personal property***
5. ***Security concerns (looters/scavengers/tourists)***

Other impacts that are still present

- Limited access to essential services
- Closures affecting childcare/work/learning
- Injury/health impacts
- Difficulty accessing food/prescriptions/supplies

*The top 5 impacts within two weeks after the storm have changed overtime indicating that improvements from the impacts immediately after the storm have occurred but needs for assistance continues.

What respondents ranked as the highest recovery priorities

1. Rebuild roads & bridges back as they were
2. Rebuild roads & bridges stronger/more resilient (even if cost/ROW increases)
3. Connect residents to recovery resources (grants/nonprofits, etc.)
4. Support local businesses to aid economic recovery
5. Rebuild housing
6. Restore environment & special natural places (incl. Reforestation)
7. Support tourism-reliant local businesses
8. Home repair resources
9. Rebuild septic/sewer/water to be more disaster-resistant
10. Restore trails & recreation with emergency access

*Community center support was neutral-leaning

Do respondents support extending sewer utilities from the east, along 74A, to no further west than Hwy 9 in place of septic repair if it includes a future-development limit?

YES **58%** **42%** *NO*

What NEW opportunities do respondents prefer

Highest-rated NEW opportunities

- Reinforce fire departments to withstand disasters
- Address environmental & natural resource risks (flooding, landslides, wildfire, habitats, water quality)
- Improve communication & emergency alerts (gauges, sirens, etc.)
- Plan land use & “build back safer” to reduce future damage
- Expand funding for local fire/rescue
- Identify a Community Resource Center (e.g., at fire stations)

Moderately-rated NEW opportunities

- Affordable housing support

Lowest-rated NEW opportunities

- Sidewalks/pathways/bike lanes

> **We are small community that needs to improve some things but not everything due to a storm. We like and love what we had ...we just need a few changes...nothing new and no new added cost to us!**

> **We need to carefully limit growth in this area and realize challenges of steep slopes and unique natural features of the protected land system and biodiversity. Prioritize completing the trail loop envisioned by Conserving Carolina to enhance the state park system beyond Chimney Rock**

> **We don’t want Gerton to be Gatlinburg or Pigeon Forge, my family has been here for generations and we don’t want to be pushed (further) out by developers or more out of state buyers.**

Overall Themes from Public Survey Results

Environmental Resilience

Respondents desired information on addressing slope stability and landslides, repairing streams and riparian zones, debris removal, reforestation, and invasive species management.

Recreation Access

The community emphasized the importance of restoring trails and river access while ensuring emergency ingress/egress routes, safety, and ongoing maintenance were prioritized.

Infrastructure & Access

Respondents said that roads and bridges are the top priority, with concerns about private drive/bridge failures, unsafe crossings, erosion control, and the need for reliable emergency access.

Housing & Affordability

Respondents voiced concerns about locals being able to repair and return home, preventing displacement, and addressing rising costs.

Emergency Preparedness

Strengthening volunteer fire capacity, improving backup power and water supplies, clearer alert and evacuation systems, and installing river gauges for real-time monitoring was important to respondents.

Community Support & Navigation

There was interest in creating a community hub or resource center to guide residents through recovery and connect them with help more efficiently.

Tourism & Economy

Respondents stated that balancing support for small local businesses with management of traffic, parking, and worries about “disaster tourism” and looting.

Smart Land Use & Rebuilding

There is an overall desire for stricter development regulations in hazard-prone areas, rebuilding standards that reduce future risk, and protecting the area’s rural character.

Comparing Survey Results Between Communities

Hickory Nut Gorge in Henderson County consists of two distinct communities. Because each community differs in both landscape terrain and population makeup, their survey responses reflected these differences.

Key Differences in Impacts

Bat Cave: Highest impacts from damage to private roads/bridges (mean 4.08) and limited access to transportation (3.90).

Gerton: Impacts centered on personal property (3.61) and health concerns (3.38); road/bridge impacts were lower (~2.8).

Bat Cave’s top concerns are mobility & access, while Gerton’s focus is property

Immediate Recovery Needs

Bat Cave also emphasized connection to recovery resources (4.16).

Gerton highlighted septic/sewer and home repair resources (3.9–4.0) along with roads.

Shared priority: Rebuilding roads & bridges was top for both, though Bat Cave rated slightly higher (4.61 vs 4.27).

Restoration Priorities

Bat Cave: Support for local businesses (4.14) and environmental restoration (3.95).

Gerton: Strongest on environmental restoration (4.00), with business support (3.7) and community center (3.65) secondary.

Bat Cave leans more to economic recovery, Gerton to environmental resilience.

New Opportunities

Bat Cave: Rated almost all options above 4.3, especially environmental protection (4.50) and fire department resilience (4.47).

Gerton: Top was funding for fire/rescue (4.44), followed by recreation infrastructure (4.24) and land use planning (4.10).

Both communities value emergency readiness, but Bat Cave’s urgency is stronger across all opportunities.

Comparison of themes that were heard

Themes from Public Survey

Environmental Resilience

Respondents desired information on addressing slope stability and landslides, repairing streams and riparian zones, debris removal, reforestation, and invasive species management.

Recreation Access

The community emphasized the importance of restoring trails and river access while ensuring emergency ingress/egress routes, safety, and ongoing maintenance were prioritized.

Infrastructure & Access

Respondents said that roads and bridges are the top priority, with concerns about private drive/bridge failures, unsafe crossings, erosion control, and the need for reliable emergency access.

Housing & Affordability

Respondents voiced concerns about locals being able to repair and return home, preventing displacement, and addressing rising costs.

Emergency Preparedness

Strengthening volunteer fire capacity, improving backup power and water supplies, clearer alert and evacuation systems, and installing river gauges for real-time monitoring was important to respondents.

Community Support & Navigation

There was interest in creating a community hub or resource center to guide residents through recovery and connect them with help more efficiently.

Tourism & Economy

Respondents stated that balancing support for small local businesses with management of traffic, parking, and worries about "disaster tourism" and looting.

Smart Land Use & Rebuilding

There is an overall desire for stricter development regulations in hazard-prone areas, rebuilding standards that reduce future risk, and protecting the area's rural character.

"Big Thoughts for Recovery" from Public Meeting

Category	Description	# of Mentions	% of 74 Comments
Environmental Resilience	Restore the river/streams for beauty, resilience, and recreation; riparian buffers; erosion control; debris removal; vegetation to prevent landslides.	28	38%
Recreation Access	Bike/pedestrian infrastructure; riverwalk; trails; community gathering spaces; parks; safe access to recreation and waterways.	21	28%
Infrastructure & Access	Stronger bridges/roads, stormwater systems, utilities, waste/transfer stations, and transportation improvements.	18	24%
Housing & Affordability	Rebuild homes, provide housing assistance, expand affordable options, support uninsured/underinsured residents.	14	19%
Emergency Preparedness	Community emergency plans, communication systems, warning alarms, fire safety, disaster readiness education.	10	14%
Community Wellbeing & Culture	Protect rural character, celebrate heritage and biodiversity, community-led projects, rebuild community center, provide trauma counseling and social services	8	11%
Tourism & Economy	Support for local businesses, infrastructure services	7	9%

Chapter 4: Recommendations

The following project recommendations were developed with impactful community feedback along with professional planning, design, and ecology expertise provided by the project team. Equinox organized the projects into eight recovery themes including: Environment, Infrastructure, Emergency Preparedness, Recreation, Community, Land Use, Housing, and Tourism & Economy, and provided an opportunity for the HNG Group and the broader public to select their top priorities.

There are three overarching recommendations that are not part of the themes identified through the course of the development of the plan. The first of which is that a dedicated contact and point person in Henderson County help move the recovery efforts forward. Henderson County has already hired a recovery coordinator, and this position will be critically important for building on the momentum established within the community over the past six months in developing the recovery plan. To help with continuing momentum for recovery, the second recommendation is that the HNG Group become established as a Task Force to help advise and collaborate with county staff with recovery projects. The third recommendation that was requested and voted on by the HNG Group is that the county hire consultants to help with grant writing, design, engineering, and implementation of recovery projects.

The Priority Projects are broken into two tiers. Tier One Priority Projects, shown below, are the top priority projects that both the HNG Group and the public voted as the most important. Tier Two Priority Projects, shown below, are those that were identified independently as most important by the HNG Group or the public. There were over 46 recommended projects based on input from the first public meeting and following discussions with the HNG Group, Henderson County and the project consultants. A summary of the Priority Projects (Tier One and Tier Two) is below. The following pages present detailed descriptions of all 46 recommendations. These are organized by recovery theme and arranged from highest priority to lowest priority in each theme. The Priority Projects do not have to be pursued or implemented in order of ranking as available funding and grants will drive the sequence of projects to be implemented. For example, a key milestone to access funding could include regional planning efforts, and this should be a key consideration. Flexibility with implementation of the recommended projects should be considered as the county navigates recovery as opportunities and priorities will change and evolve overtime.

Tier One Priority Projects

Ranking	Project	Theme
1	**Strengthen Support For Volunteer Fire Department**	**Emergency Preparedness**
2	**Integrated Forest Recovery & Hazard Fuel Reduction**	**Emergency Preparedness**
3	**Bat Cave Recreation Corridor**	**Recreation**
4	**Restore Stream Channel & Floodplain Along The Rocky Broad**	**Environment**
5	**Convenience & Recycling Center**	**Infrastructure**
6	**Hickory Nut Gorge Regional Recreation Plan**	**Recreation**
7	**Bearwallow Mountain Road Paving & Drainage Project**	**Infrastructure**

"Anything is possible so we should dream big and include everything because this plan will guide the Gorge's future over the next 10 years and beyond."
— John Anderson, HNG Group Member

Recommendation Icons

Each recommendation theme has been identified with a specific icon. Throughout the following pages recommendations that relate to themes other than the ones they are listed in will have the icon of the additional themes listed at the bottom of that project explanation. Many of the recommendations on the following pages relate to several themes, benefiting the Hickory Nut Gorge in multiple ways.

Environment

Infrastructure

Emergency Preparedness

Recreation

Community

Land Use

Housing

Tourism & Economy

Tier Two Priority Projects

Ranking	Project	Theme
8	Siren Alert System & Public Education Campaign	Emergency Preparedness
9	Strategic Buyout Parcel Reuse Plan	Land Use
10	Rocky Broad River Park	Recreation
11	Bridge, Culvert, & Erosion Control Improvements	Infrastructure
12	Signage Package	Tourism & Economy
13	Reestablish Upper Hickory Nut Gorge Community Center As A Community Hub (To Include Community Park & Memorial Garden)	Community
14	Reedy Patch Creek Enhancements	Environment
15	Restore Stream Channel & Floodplain Along Hickory Creek	Environment
16	Middle Fork Road Reconstruction	Infrastructure
17	Explore A Landslide Early Response And Monitoring System	Emergency Preparedness

Section A: Environment

$ < 250K
$$ - 250-500K
$$$-500K-1M
$$$$-1M-3M
$$$$$ > 3M

PROJECT NAME	BRIEF DESCRIPTION OF PROJECT	PRIORITY (High, Medium, Low)	POTENTIAL KEY STAKEHOLDER	POTENTIAL PARTNERS	POTENTIAL COST
RIVER CORRIDOR REPAIR					
Restore stream channel and floodplain along Hickory Creek	The restoration of the stream corridor to remove deposition, increasing channel stability, re-vegetate the floodplain, and increase recreation and emergency access.	High	Henderson County & USACE	MountainTrue & USFWS	$$$$$
Restore stream channel and floodplain along the Rocky Broad River	The restoration of the stream corridor to remove deposition, increasing channel stability, re-vegetate the floodplain, and increase recreation and emergency access.	High	Henderson County & USACE	MountainTrue & USFWS	$$$$$
FOREST HEALTH & WILDFIRE RESILIENCE					
Integrated Forest Recovery & Hazard Fuel Reduction	Implement a landscape-scale program to mitigate wildfire risk, manage invasive species, and strategically reforest critical areas.	High	NCFS & Conserving Carolina	The Nature Conservancy, Henderson County Emergency Management, & USDA	$$$$
RIPARIAN AREA RESTORATION					
Reedy Patch Creek Enhancements	The NCDOT is working on implementing bank stabilization work along Reedy Patch Creek using a rip rap matrix system which will not improve habitat along the creek. It is recommended that Henderson County communicate with NCDOT requesting that in areas where a rip rap matrix is not being implemented, that riparian plantings be included in their stabilization efforts including planting in between the opening of the rip rap in areas that will not be filled with concrete.	High	Henderson County & NCDOT	MountainTrue	N/A
Stream and River Riparian Buffer Restoration (areas that are not being addressed by NCDOT)	Implement a series of bioengineering and re-vegetation techniques to restore the ecological function of riparian buffers along heavily impacted streams.	Medium	Conserving Carolina & Henderson County Soil & Water	MountainTrue & USFWS	$$$
LANDSLIDES & DEBRIS FLOW STABILIZATION					
Debris Flow Stabilization Program	Stabilize active debris flows through the targeted application of soil bioengineering practices.	Low	NCDOT & Conserving Carolina	NCGS & USGS	$$$$$

General Summary

The most immediate and dramatic consequences of Tropical Storm Helene were on the natural landforms of the Gorge. Debris flows scoured hillsides, stripping away soil and vegetation and depositing tons of sediment, boulders, and organic debris directly into the lower, flatter portions of the watershed. The river system itself experienced radical changes; extreme flows caused significant channel widening, avulsions (where the river abruptly changes its course), and severe bank erosion. This mass wasting of the riverbanks and adjacent slopes has destabilized the entire riparian corridor, leaving behind a scarred landscape vulnerable to further erosion and compromising the foundational structure of the river valley.

Ecologically, the impacts of Helene were equally severe, particularly within the sensitive riparian zone, the critical interface between land and river. The storm uprooted and destroyed vast stands of mature canopy along the riverbanks, eliminating vital habitat and a key source of shade that regulates water temperature for aquatic species. Loss of riparian buffer also means less material to capture sediment, slow floodwaters, intercept runoff, and results in a reduced capacity for filtration of pollution before it reaches the river. The immense sediment load that washed into the river smothered crucial aquatic habitats, burying the rocky substrates essential for fish spawning and for the macroinvertebrates that form the base of the aquatic food web. Debris flows and landslides also likely impacted species like the endemic Hickory Nut Gorge Green Salamander. This disruption has damaged the Gorge's biodiversity and overall ecosystem health.

The cumulative effect of these environmental damages presents both a profound challenge and a unique opportunity for recovery. The Gorge's natural systems have been fundamentally altered, and much of the landscape outside of the streambed is now in a state of active instability, posing ongoing risks to both infrastructure and the environment. Therefore, the recovery effort must be rooted in a system resiliency first approach. Addressing the core issues of channel instability, floodplain dynamics, and riparian buffer degradation is an essential first step toward building a more resilient ecosystem that can safely accommodate future recreational use.

General Thoughts

River Corridor Repair

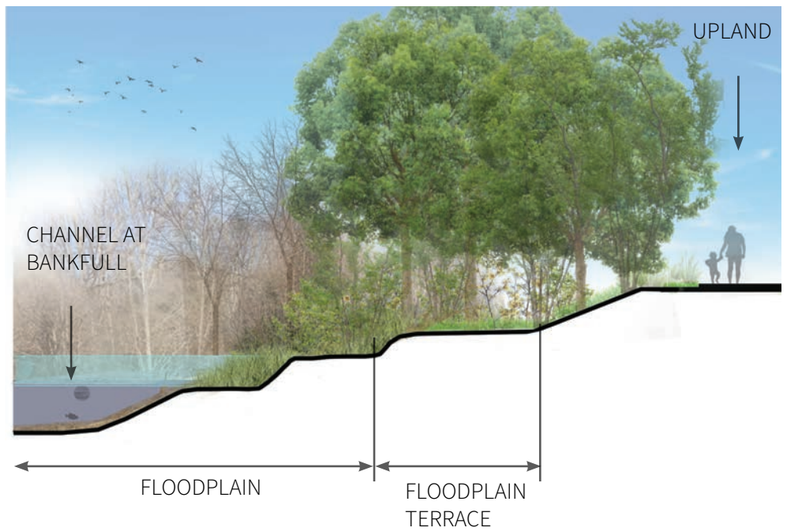
In general, it is recommended to allow woody debris to remain in place in channels where it does not threaten health, safety and welfare of the communities by posing an immediate threat to bridges or culverts. Eventually the wood will break down and provide necessary nutrient loads to support the riverine ecosystems. It can also be repurposed in stream bank protection and in-channel structures for stream restoration. Much of the channel through the Hickory Nut Gorge is relatively stable, with more focus being needed on floodplain restoration, terrace revegetation, and stabilization of slopes in upland areas.

Forest Health & Wildfire Resilience

The high winds of Tropical Storm Helene damaged thousands of acres of forest, leaving a massive volume of downed trees and debris. This has created a dual threat: an unprecedented hazardous fuel load that dramatically increases the risk of catastrophic wildfire, and a disturbed landscape ripe for rampant growth of Non-Native Invasive Plants (NNIPs). Species like kudzu and Asiatic bittersweet, already present in the Gorge, aggressively colonize these disturbed areas, outcompeting native vegetation and providing poor soil stabilization, potentially even contributing to slope failures. A successful recovery requires an integrated strategy that addresses both wildfire risk and invasive species in tandem to restore a healthy, resilient native forest.

Riparian Area Restoration

The riparian ecosystems, the vegetated corridors along streams, are essential for the health of the Hickory Nut Gorge watershed. They filter pollutants, stabilize banks, provide critical wildlife habitat, and regulate water temperature for aquatic life. Tropical Storm Helene scoured these zones, stripping away vegetation and topsoil, which has severely compromised these ecological functions. The primary goal is to implement a science-based restoration strategy that rebuilds soil, re-establishes native plant communities, and restores the natural resilience of the Gorge's river corridors.



Lining streambanks with rip rap has little to no habitat value and does not help restore riparian zones. The North Carolina Wildlife Passage Guidance discourages overuse of riprap. Consider alternatives to hard solutions that also serve to re-construct the riparian buffers, such as sloping and planting where feasible.

According to guidance from North Carolina Department of Transportation and North Carolina Wildlife Resources Commission: Wildlife Passage Guidance, "Widespread use of riprap creates barriers to wildlife movement; riprap should be avoided where effective soil stabilization can be achieved with vegetation." (Source: North Carolina Department of Transportation and North Carolina Wildlife Resources Commission. Wildlife Passage Guidance. July 2024, *connect.ncdot.gov/resources/Environmental/EPU/Policy/Documents/NCWRC-NCDOT_Wildlife_Passage_Guidance.pdf*)

Landslides & Debris Flow Stablization

The many landslides and debris flows triggered by Tropical Storm Helene represent an ongoing and significant geohazard. These unstable scars on the landscape threaten to reactivate in future rain events, posing a direct risk to downstream homes, roads, and infrastructure. Furthermore, they are a chronic source of sediment, which continuously degrades water quality and smothers aquatic habitat in the Gorge's rivers. Recognizing that NCDOT and other entities will need to implement complex geoengineered solutions on debris flows that have a direct effect on transportation infrastructure, outside of those instances the primary recommendation is to utilize low-tech, cost-effective soil bioengineering techniques that can be implemented on a community scale; however, due to the scale of the issue of unstable slopes this will overall be a high-cost endeavor. These methods work with nature to slow water, trap sediment, and re-establish the native vegetation that ultimately provides the most effective long-term stabilization.

Most debris flows occurred primarily in areas already identified as the most susceptible to slope failure. Those areas remain highly susceptible and preventing future debris flows is equally critical. This requires a proactive approach, including mapping of failed culverts, including culverts on private land, and updating land-use policies to avoid oversteepening slopes for roads and homesites and ensuring all new culverts are adequately sized to pass water and debris, preventing dangerous impoundments. Larger culvert sizing along with design considerations for aquatic organism passage would also result in ecological uplift in the Hickory Nut Gorge. This could either be in the form of an open bottom configuration for culverts or closed bottom configuration with natural stream bed material filling the bottom. The latter is primarily for lower gradient streams where high velocities will not flush out the natural material.

It is important to recognize that landslides are a naturally occurring geohazard in the Hickory Nut Gorge. Landslide hazard maps have been published for the area that identify where landslides are likely to initiate and where the resulting debris flows would likely travel during a severe storm event. Furthermore, intensity thresholds of rainfall likely to trigger landslide activity have been identified. However, this formal understanding of landslide processes is relatively recent, with historic development existing in high hazard areas for much of Western North Carolina. Thus, community outreach and education is an effective method for preventing loss of life during a severe storm event. Community outreach and education to connect people with existing resources has been included in the Emergency Preparedness section of this document.

Project Recommendations

River Corridor Repair

Restore stream channel and floodplain along Hickory Creek

Location: 35.456325°, -82.298532°

Utilize grant funding to support the restoration of the stream corridor in this location. Explore United States Army Corps of Engineers (USACE) Section 206 – Aquatic Ecosystem Restoration cost share funding. This is needed as NC Department of Transportation (NCDOT) will not be completing any restoration efforts here, yet the stream corridor needs repair to minimize further impacts from future flood events.

Potential Key Stakeholder: USACE and Henderson County

Potential Partners:

- NC Division of Water Resources: Annual grants to support stream restoration and water-based recreation projects across North Carolina.
- MountainTrue: Could lead volunteer coordination for planting efforts and assist with water quality monitoring.
- American Rivers: Can provide funding awareness and technical support on river restoration best practices.
- Trout Unlimited: Can provide funding awareness and technical support on river restoration best practices.
- US Fish & Wildlife Service (USFWS): Offers technical assistance, especially regarding threatened and endangered species, and potential federal funding avenues.
- American Whitewater: Can provide valuable input on restoring river access points and ensuring projects align with recreational uses.
- NC Wildlife Resources Commission: Offers technical assistance, especially regarding threatened and endangered species, and potential federal funding avenues.
- The Conservation Corps Network (TCN): Cost-effective way to help restore and maintain natural areas while educating and engaging the community
- NC Parks and Recreation Trust Fund (PARTF): A potential key funding source for projects on or adjacent to public lands like Chimney Rock State Park.
- NC Land and Water Fund (NCLWF): A potential funding source for stream restoration projects that improve water quality, sustain ecological diversity, restore habitat for fish and wildlife, filter stormwater runoff and reduce pollutants from entering waterways.

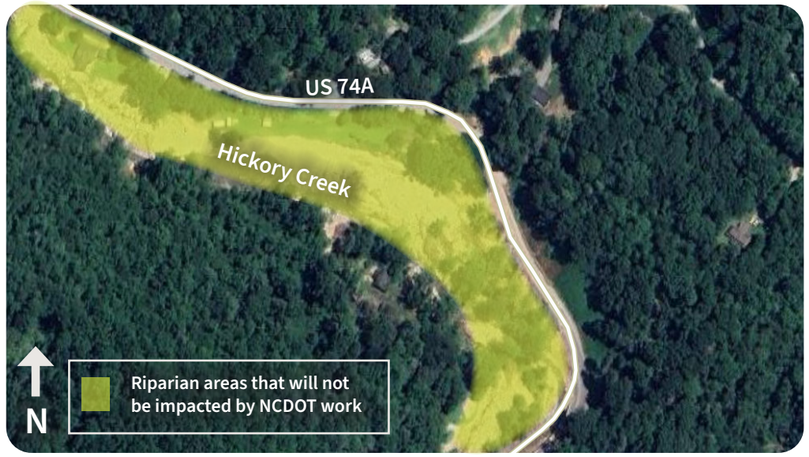
General Cost: $$$$$

Project Description: The restoration of the stream corridor to remove deposition, increasing channel stability, re-vegetating the floodplain, and increase recreation and emergency access. The entire site is a depositional zone of the floodplain; change detection analysis indicates an increase in elevation of ~8-10 ft on the floodplain bar, indicating significant deposition at this site. Most of the vegetation has been stripped or buried by sediment. The riverbed looks mostly stable with a few instances of instability, which may result in headcutting (continued erosion) in the up-valley direction. The few streambed instabilities could be stabilized with a short series of instream structures, consisting of a mix of rock, large wood, and brush. Implementing these improvements will result in improved aquatic habitat. Removal of a portion of the deposition will increase flood storage across the site, creating an opportunity for a small picnic area in a potentially regraded floodplain. It is suggested that the large quantity of woody debris which remains onsite could be chipped for later decomposition to build topsoil.

Project Benefit: This project will increase the resilience of this portion of the river by removing extreme deposition, increasing channel stability, revegetating the floodplain, and increasing recreation and emergency access.

Recreation Connection

Restoration of sections of Hickory Creek can also provide safe access to the creek for recreation.



Restore stream channel and floodplain along Rocky Broad River

Location: (Bat Cave Confluence) 35.452098°, -82.290777°

Explore USACE Section 206 – Aquatic Ecosystem Restoration cost share funding.

Potential Key Stakeholder: USACE and Henderson County

Potential Partners:

- NC Division of Water Resources: awards annual grants to support stream restoration and water-based recreation projects across North Carolina.
- MountainTrue: Could lead volunteer coordination for planting efforts and assist with water quality monitoring.
- American Rivers: Can provide funding awareness and technical support on river restoration best practices.
- Trout Unlimited: Can provide funding awareness and technical support on river restoration best practices.
- US Fish & Wildlife Service (USFWS): Offers technical assistance, especially regarding threatened and endangered species, and potential federal funding avenues.
- American Whitewater: Can provide valuable input on restoring river access points and ensuring projects align with recreational uses.
- NC Wildlife Resources Commission: Offers technical assistance, especially regarding threatened and endangered species, and potential federal funding avenues.
- The Conservation Corps Network (TCN): Can Provide a cost-effective way to help restore and maintain natural areas while educating and engaging the community.
- NC Parks and Recreation Trust Fund (PARTF): A potential key funding source for projects on or adjacent to public lands like Chimney Rock State Park.
- NC Land and Water Fund (NCLWF): A potential funding source for stream restoration projects that improve water quality, sustain ecological diversity, retore habitat for fish and wildlife, filter stormwater runoff and reduce pollutants from entering waterways.

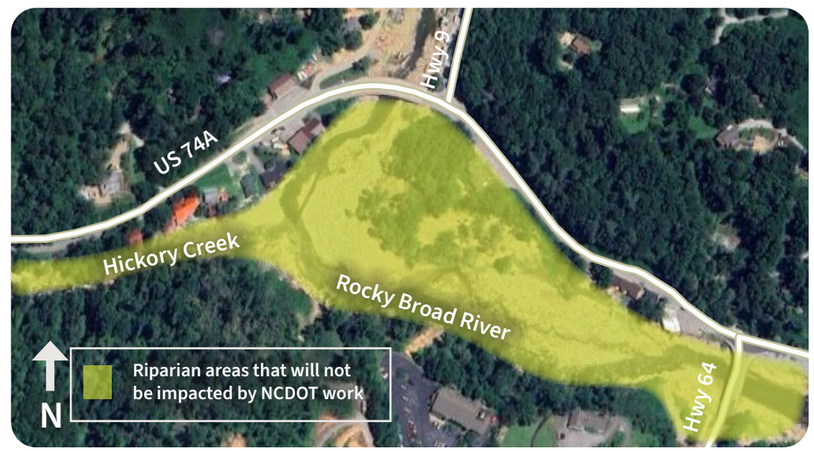
General Cost: $$$$$

Project Description: The restoration of the stream corridor to remove deposition, increasing channel stability, re-vegetating the floodplain, and increase recreation and emergency access. Utilize grant funding to support the restoration of the stream corridor in this location. This is needed as NCDOT will not be completing any restoration efforts here, yet the stream corridor needs repair to minimize further impacts from future flood events. The entire site is a deposition zone of the floodplain and received significant deposition, in addition, a significant amount of vegetation has been stripped from the banks. However, the riverbed of the Rocky Broad River appears to be mostly stable. This project suggests removing and regrading some of the floodplain areas adjacent to the river to increase flood storage, and revegetation of the riverbank and floodplain to increase stability, improve water quality and temperature, and create opportunities for small public park spaces. It may be advantageous to realign the Rocky Broad River to the right, away from the fire station.

Project Benefit: This project will increase the resilience of this portion of the river by removing extreme deposition, increasing channel stability, revegetating the floodplain, and increasing recreation and emergency access.

Recreation Connection

Restoration of sections of Rocky Broad River should be integrated into the Bat Cave Recreation Corridor and Rocky Broad River Park projects.



Forest Health & Wildfire Resilience

Integrated Forest Recovery & Hazard Fuel Reduction

Locations: Prioritized areas on conserved and park lands, focusing on south- and southwest-facing slopes with heavy fuel loads, and known Non-Native Invasive Plants (NNIP) hotspots.

Potential Key Stakeholder: A task force led by the NC Forest Service and Conserving Carolina to coordinate efforts across public and private lands.

Potential Partners:

- The Nature Conservancy: Can provide scientific expertise on fire ecology and management.
- USDA (Forest Service & Natural Resources Conservation Service (NRCS): Key sources for technical assistance and federal funding programs.
- National Fire Protection Association's Firewise USA program: Assist neighborhoods by organizing efforts to make homes and neighborhoods more likely to withstand wildfire.
- North Carolina Invasive Plant Council: Offers expertise on NNIP identification, mapping, and best management practices.
- NC Wildlife Resource Commission: - HNG is a biodiversity hotspot with numerous Species of Greatest Conservation Need (SGCN). Any habitat restoration and forest resilience work might entail a thorough review of potential endemic and sensitive plant species present in the site
- Other entities like NCDOT, Duke Energy, and NC State Parks for work within their respective jurisdictions.

General Cost: $$$$ This reflects a multi-faceted program. Costs include contractor services for fuel reduction, specialized herbicide applicators, GIS mapping, project management, and nursery stock for reforestation.

Project Description: This project will implement a landscape-scale program to mitigate wildfire risk, manage invasive species, and strategically reforest critical areas. The work will focus on protected lands within Chimney Rock State Park and on properties under conservation easement, where the investment in recovery will be permanently secured. This program recognizes that debris removal, invasive species control, and trail repair are interconnected activities that should be executed concurrently for maximum efficiency.

Methods & Techniques:

1. Hazard Fuel Reduction: Strategically thin understory vegetation and remove a portion of the downed timber to break up "ladder fuels" that carry fire into the canopy. This work will create shaded fuel breaks, particularly on drier, sun-exposed slopes. Debris removal will be coordinated with the repair of backcountry infrastructure like trails and bridges to restore access.

2. Invasive Species Management: Systematically map infestations (using ground crews and remote sensing) and deploy targeted treatment plans. This involves developing a comprehensive management strategy that outlines the roles and responsibilities of all participating public and private landowners.

3. Strategic Reforestation: In most areas, a "wait and see" approach will allow for natural regeneration from the native seed bank. However, in high-priority zones, or where regeneration fails, we recommend the County consider active reforestation. This will consist of planting native, resilient, and fire-adapted species, with a focus on oaks (where appropriate), to provide critical habitat for species of concern that cannot thrive in the current, degraded conditions.

Project Benefit:

- **Public Safety:** Reduces the risk of intense, uncontrollable wildfires, protecting communities and infrastructure.
- **Ecological Integrity:** Allows the native forest canopy to return in a structurally sound and ecologically functional state, preventing conversion to invasive-dominated thickets.
- **Habitat Restoration:** Provides and restores essential habitat for species of concern and the full suite of native fauna.
- **Long-Term Resilience:** Stabilizes exposed soils and establishes a healthier forest more resilient to future disturbances like storms, droughts, and pests.

Riparian Area Restoration

Reedy Patch Creek Enhancements

Locations: Along Reedy Patch Creek

Potential Key Stakeholder: Henderson County & NCDOT

Potential Partners: NC Division of Water Resources, US Fish & Wildlife Service, and MountainTrue

General Cost: $

Project Description: The NCDOT is working on implementing bank stabilization work along Reedy Patch Creek using a riprap matrix system. It is recommended that Henderson County communicate with NCDOT requesting that in areas where a rip rap matrix is not being implemented, that riparian plantings such as livestakes be included in their stabilization efforts including planting in between the opening of the rip rap in areas that will not be filled with concrete.

Project Benefit: The application of a rip rap matrix system is an engineered solution to stabilize the streambanks, however it limits the ability to plant riparian vegetation that is integral to a healthy function ecological stream system. By adding vegetation where possible, it will not only soften the hard engineered appearance of the streambank, but it will also provide habitat enhancements.

Stream and River Riparian Buffer Restoration

Locations: Priority sites along Hickory Creek, the Rocky Broad River, and Reedy Patch Creek that are not being restored by NCDOT. Specific parcels could be selected based on severity of damage, landowner willingness, and ecological significance.

Potential Key Stakeholder: Conserving Carolina is the proposed lead due to its established local presence, expertise in land conservation, and strong relationships with private landowners throughout the Gorge. Henderson County Soil and Water would also be involved as a lead agency here. If Section 206- Aquatic Restorations were obtained and available, USACE would also be involved.

Potential Partners:

- NC Divison of Water Resources: awards annual grants to support stream restoration and water-based recreation projects across North Carolina.
- MountainTrue: Could lead volunteer coordination for planting efforts and assist with water quality monitoring.
- American Rivers: Can provide funding awareness technical support on river restoration best practices.
- US Fish & Wildlife Service (USFWS): Offers technical assistance, especially regarding threatened and endangered species, and potential federal funding avenues.
- American Whitewater: Can provide valuable input on restoring river access points and ensuring projects align with recreational uses.
- The Conservation Corps Network (TCN): Cost-effective way to help restore and maintain natural areas while educating and engaging the community
- NC Parks and Recreation Trust Fund (PARTF): A potential key funding source for projects on or adjacent to public lands like Chimney Rock State Park.

General Cost: $$$ Costs are dependent on the final mileage of streams restored. This estimate includes project design, permitting, materials (plants, coir logs), contractor labor for earthwork

Project Description: This project will implement a series of bioengineering and revegetation techniques to restore the ecological function of riparian buffers along heavily impacted stream reaches. The project is designed not just to repair damage but to help build back a more resilient ecosystem. A critical initial step is the systematic mapping, removal, and management of non-native invasive plants (NNIP), such as Japanese Knotweed and Multiflora Rose, which outcompete native species and offer poor erosion control.

Methods & Techniques: A phased approach is suggested:

1. **Site Stabilization:** Install biodegradable erosion control measures, such as coir fiber logs and jute matting, to stabilize bare soil and reduce sediment runoff immediately.
2. **Soil Amendment:** Where topsoil has been completely scoured, amend the substrate with a mixture of locally sourced compost and sand to create a viable medium for planting.
3. **Bioengineering:** Utilize live staking of native, fast-rooting species like silky dogwood and black willow to create a living, structural matrix that holds banks together. Use fabric encapsulated soil lifts, or vegetated geogrids. These use soil encapsulated in biodegradable geotextile fabric and are interplanted with live cuttings of native riverine shrubs and small trees.
4. **Native Revegetation:** Plant a dense community of native riparian vegetation which would serve both humans and wildlife. For example, a groundcover of river oats and sedges, a shrub layer of hazelnut, elderberry and ninebark, and canopy trees like pawpaw, persimmon, sycamore and river birch, to restore a multi-layered, functional buffer.

Project Benefit:

- **Ecological:** Improves water quality by filtering sediment and pollutants, restores shaded riverine habitat for fish and aquatic insects, and re-establishes a vital wildlife corridor.
- **Hydrological:** Increases floodplain roughness to slow floodwaters during future storm events, reducing peak flow energy and minimizing downstream damage.
- **Community:** Protects private property and public infrastructure from further erosion, enhances aesthetic value, and creates opportunities for volunteer engagement in the recovery process.

Landslide & Debris Flow Stabilization

Debris Flow Stabilization Program

Locations: High-risk debris flow tracks identified in partnership with the NC Geological Survey (NCGS) that threaten public infrastructure or significant natural resources.

Potential Key Stakeholder: A dual-lead approach is recommended. NCDOT could lead all stabilization efforts within state highway rights-of-way. Conserving Carolina could lead projects on owned fee simple and conserved lands, leveraging their landowner relationships and conservation expertise.

Potential Partners:

- NC Geological Survey (NCGS) & US Geological Survey (USGS): Essential for providing technical expertise, landslide hazard mapping, and site-selection guidance to ensure efforts are focused on the highest-risk areas.US Forest Service and NC Forest Service: Can advise on appropriate tree species and management of woody debris.
- NC Wildlife Resource Commission: - Hickory Nut Gorge is a biodiversity hotspot with numerous Species of Greatest Conservation Need (SGCN). Any habitat restoration and slope stabilization work might entail a thorough review of potential endemic and sensitive plant species present in the site.

General Cost: $$$$ Although low-tech and cost effective on the community level, at the Gorge level this is a high-cost endeavor reflecting the scale of the problem. Costs may include detailed geotechnical assessments for high-risk sites, specialized contractor services for earthwork, and bulk material purchase (coir logs, plants, seed, etc.).

Project Description: This project will improve the stability of active debris flows through the targeted application of soil bioengineering practices. The strategy recognizes that a debris flow is not uniform and requires different interventions in its three distinct zones: the initiation zone (where it started), the transport zone (the path it followed), and the deposition zone (where the debris settled). We propose implementing these stabilization practices at high-priority demonstration sites on conserved lands, within state parks, and on the property of willing private landowners to serve as models for broader community action.

Methods & Techniques by Debris Flow Zone:

1. Initiation Zone: At the landslide scarp, the goal is to prevent further erosion and reduce water infiltration. Techniques include removing loose materials and re-grading the slope to a more stable angle, followed by the installation of a permanent Turf Reinforcement Mat or similar product and immediate hydroseeding with a native, warm-season grass mix and a cover crop for rapid soil protection.

2. Transport Zone: Along the chute, the objective is to slow water velocity and encourage sediment to drop out. This will be achieved by installing a series of rock or log check dams, wattle fences (wattles are bundles of branches), and creating staggered brush layers embedded in the slope. Live staking of dormant woody cuttings will be used extensively to establish a living, self-repairing system of stabilization. Deep-rooting, fast-growing native trees (e.g., Black Locust or Virginia Pine) can be planted in some areas to create a strong root matrix for long-term stability

3. Deposition Zone: In the runout or debris fan, the focus is on securing the vast amount of deposited material to prevent it from washing into streams. This involves creating gentle terraces, installing coir fiber logs, and intensively revegetating the area with native grasses, shrubs, and trees to bind the loose soil and sediment permanently.

Project Benefit:

- **Public Safety:** Directly minimizes the risk of debris flow reactivation, protecting human lives, homes, and critical infrastructure like roads and bridges.
- **Environmental Health:** Drastically reduces chronic sediment pollution in the Rocky Broad River and its tributaries, leading to improved water clarity and restored aquatic habitat.
- **Ecosystem Restoration:** Re-establishes native plant communities on scarred landscapes, restoring habitat connectivity for wildlife.
- **Community Resilience:** Empowers landowners and community groups with low-cost, effective techniques to address slope instability on their own properties.

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Section B: Infrastructure

$ < 250K
$$ - 250-500K
$$$-500K-1M
$$$$-1M-3M
$$$$$ > 3M

PROJECT NAME	BRIEF DESCRIPTION OF PROJECT	PRIORITY (High, Medium, Low)	POTENTIAL KEY STAKEHOLDER	POTENTIAL PARTNERS	POTENTIAL COST
ROADS & BRIDGES					
Middle Fork Road Reconstruction	Reconstruct road to address repeated mudslide failures mentioned by the public; consider permanent reroute (e.g., no hairpin turn).	High	NCDOT	NCEM	$$$$
Private Bridge & Driveway Recovery Program	Secure additional funding and technical support for private infrastructure restoration.	High	NCEM	Henderson County	$$–$$$$
Bearwallow Mountain Road paving and drainage upgrades	Provide full paving and drainage upgrades to ensure safe access for residents and emergency services. Up-size culverts to address consistent erosion and flooding issues.	High	NCDOT	Local landowners	$$$$
US-74A River Road	While NCDOT is reconstructing the roadway, advocate for a more resilient roadway with floodplain benches, up-sized drainage, and wide shoulders.	Medium	NCDOT	FEMA PA, FHWA	$$$$
Bridge, Culvert & Erosion Control Improvements	Upgrade culverts and erosion control to protect driveways and prevent runoff damage. Investigate best practices for future improvements that will support long-term solutions.	Medium	NCDOT	Henderson County	$$$
MULTIMODAL & GREENWAYS					
US 74A Path (From Bat Cave towards Chimney Rock)	Connect to the proposed Chimney Rock (Raise the Rock Action Plan) and connect to their proposed “Riverwalk” with a path adjacent to US 74A between Bat Cave and Chimney Rock. As this road gets re-built Henderson County can advocate and seek funding to integrate a path at the elevation of the roadway. Ensure use/access by emergency services.	Medium	NCDOT	FBRMPO, Henderson County	$$$$
Bat Cave and Edneyville bicycle and pedestrian feasibility study	Conduct a paved trail feasibility study to determine if it is possible to create a continuous off-road greenway that connects Bat Cave and Edneyville.	Low	Henderson County	Conserving Carolina, NC Parks	$$
DEBRIS, WASTEWATER, & SEWER INFRASTRUCTURE					
Determine and Implement a Convenience Center / Recycling Center	Conduct a site suitability study and establish a convenience center and recycling center in proximity to both Bat Cave and Gerton.	High	Henderson County Solid Waste Department / Henderson County Government	Henderson County Emergency Services; NCDEQ; NCDOT; Gerton and Bat Cave Volunteer Fire Departments; Local Landowners	$$$
Feasibility Study for Wastewater Utilities	Explore the feasibility of extending sewer utilities from Chimney Rock up to Hwy 64.	Low	Henderson County	Land-of-Sky Regional Council and MountainTrue	$$$$

General Summary

The Hickory Nut Gorge's aged and constrained roadway network is its lifeline - for residents, visitors, and emergency services. Tropical Storm Helene isolated communities when it damaged or destroyed roads, private bridges, culverts, and communication systems. At the September 2025 community meeting and through the project's online survey, residents voiced urgent needs for debris removal, stronger and larger culverts, private bridge replacements, and regular information about road rebuilding.

Rebuilding the road infrastructure in Hickory Nut Gorge must be considered in the context of its geography. Due to the steep terrain and narrow valleys, the area's roadways generally parallel streams and occupy, or are in proximity to, the same low-lying corridors. As a result, when the Rocky Broad River and its tributaries spilled over their banks, the nearby roadways washed out, severely in many places, throughout the Gorge. At the same time, the high waters destroyed the riparian buffer between the roads and streams. The buffer, made up of trees, shrubs and soil, helps to protect water quality, keeps temperatures in the stream cool enough for trout and other species, and keeps soil from eroding into the streams. Recovery of the two systems – the streams and roadways—must be considered holistically.

Furthermore, this part of Henderson County includes a high proportion of national, state, and regional "Sensitive Natural Areas" as identified in Henderson County's Comprehensive Plan. Most streams in the study area are designated "Trout" waters by the NC Department of Environmental Quality (NCDEQ) stream classification system. This designation requires any development or land grading to occur outside of the 25' foot riparian buffer.

Many of the riparian corridors were destroyed in the flooding event. Re-establishing these forested buffers in tandem with re-building roads, culverts, bridges, and other transportation infrastructure needs to be an overarching consideration.

In the process of rebuilding the roadways and addressing the streambank stabilization, there is also a rare opportunity to expand sustainable modes of transportation (biking and walking). This opportunity is most evident between Bat Cave and Chimney Rock where the road and adjacent land parcels were washed into the Rocky Broad River and where the river channel will need to be modified to enable roadway reconstruction.

Bicycle and pedestrian facilities have been recommended in previous local plans in this area as follows:

- Chimney Rock Village Comprehensive Plan 2016: This plan describes a future "Village Trail" along US Highway 64/74A, which is intended to create a pathway throughout the Village to link the communities of Lake Lure and Bat Cave.
- The Lake Lure-Chimney Rock Comprehensive Transportation Plan (CTP): recommends a multi-use path (MUP) or sidepath along US 74A from the Henderson County line to Lake Lure (including the project area).

Furthermore, in the vicinity of the project, the French Broad River MPO (FBRMPO) CTP includes a recommendation for an off-road bicycle facility on US 64 (Chimney Rock Road) from Laycock Road to US 74A. This would create additional demand for multimodal transportation in the project area.

There are many competing needs within this constrained study area; however, the recovery work presents a rare opportunity to reconfigure the roadway system and to address overlapping needs in a manner that better serves generations to come.

Key Issues

Residents of Hickory Nut Gorge overwhelmingly prioritized rebuilding roads and bridges — not just as they were, but more resilient and flood resistant. As of approximately 11 months' post Helene, the following key remaining concerns were gleaned from public comments:

- Bridge failures due to debris loads and inadequately sized culverts.
- Substandard driveways and crossings (perceived to be unsafe) over tributary streams.
- Limited emergency access, especially for fire and emergency medical services (EMS).
- Washouts and erosion (repeated, even in lower intensity storm events) especially on Middle Fork Road and High Falls Road.
- Need for multimodal infrastructure for people who bike and walk, such as bike lanes, sidewalks, and greenways.
- It was noted that poor development practices cause damage.
- Bearwallow Mountain Road was noted to be in critical need of paving and stormwater improvements.

General Thoughts

Transportation infrastructure includes roads, bridges, culverts and multimodal paths such as greenways and sidepaths. Whether public or private, roads and their infrastructure can support future resiliency depending on how they are designed, what materials are used, and where they are located. The Hickory Nut Gorge community and Henderson County can consider implementing the following guidelines to improve infrastructure resiliency.

Placement

While re-constructing roads consider leaving enough land for the riparian buffer, which is the strip of land adjacent to a streambank. While rebuilding sections of road, set aside shoulders wide enough to accommodate bicycles at a minimum. Where space allows, advocate for greater width to accommodate multi-use sidepaths that have separation from vehicle traffic.

Where possible, provide greenways and sidepaths parallel to the road at the elevation of the roadway rather than immediately adjacent to a stream or river. This will help protect the Rocky Broad River and its tributaries by leaving room to re-establish a riparian buffer between the roadway and river. This will also provide additional roadway stabilization and has mutual benefits for the built and natural environment.

Materials

Consider resilient material selection for culverts, bridges, and other infrastructure.

- Culverts: Consider using concrete over corrugated steel or a combination of both (a corrugated steel pipe with a concrete headwall). While concrete can be more expensive initially, the life-cycle-cost could be comparable over time as concrete culverts can withstand force and flooding better than other materials. (Source: Keller, Gordon and Genesee Consulting. "Building Climate-Resilient Highways and Rural Roads." Building Climate-Resilient Highways & Rural Roads, training course, 2024, *www.irf.global/assets/pdf/2024-CRRws-DC.pdf*).
- Bridges: Consider concrete bridges, engineered wood or Fiber Reinforced Polymers (FRP) as a bridge material.
  - FRP's are lightweight, durable, and resistant to corrosion from water, chemicals, and environmental exposure. FRPs are versatile and can be used in new construction or retrofitting existing structures as support elements.
  - Engineered wood is strong, lightweight, and flexible. Its ability to resist cracking and warping makes it more reliable in disaster situations. Additionally, engineered wood products are often sourced sustainably. (Source: Ruiz, Carlo. "Innovative Building Materials for Disaster Recovery and Resilience — ACMS | Full-Service Construction Management Services." ACMS | Full-Service Construction Management Services, 7 Jan. 2025, *www.acmsglobal.com/blog-page/innovative-building-materials-for-disaster-recovery-and-resilience*).

While these materials are also recommended for private roads and bridges these options may not be possible without funding assistance due to costs. A recovery program is recommended to help landowners of private bridge and driveway repairs to be more resilient.

Bridges

The loss of bridges was widespread and there is a need to rebuild in a way that balances cost with future durability of materials to withstand future flood events. There are a variety of resilient bridge practices and designs that can better withstand flooding events. Examples include: clear spans over the channel where feasible, avoid mid-channel piers, elevate bridge decks, and embed the piers deeper than needed to prevent dislodging).

One of the main causes of bridge dislocation is scour. Bridge scour is the removal of sediment like sand and gravel from around bridge abutments or piers. Scour holes can compromise the integrity of a structure.

According to Federal Highway Administration (FHWA), avoiding unfavorable flow patterns is recommended over the use of riprap. "Riprap can help prevent scour, but (FHWA) recommends design criteria in Hydraulic Engineering Circular (HEC)-18 and 23, such as avoiding unfavorable flow patterns, streamlining the abutments, and designing pier foundations resistant to scour without depending upon the use of riprap or other countermeasures." (Source: Bridge Scour Evaluation: Screening, Analysis, and Countermeasures. www.fs.usda.gov/eng/pubs/html/98771207/98771207.html.)

The county's floodplain development standards require developers to construct bridges outside of the base flood elevation (BFE), plus freeboard, or a factor of safety of an additional 2-4 feet above the BFE. Educational materials can be developed to help explain these concepts and the reason for adherence to the ordinance.

Culverts

Culvert replacement and improved capacity are needed throughout the study area. In addition to the material used, correct sizing, and placement techniques are important to keep culverts from clogging and maintain fish and other aquatic species movement.

If the volume of water in the stream exceeds the capacity of a culvert, the well-being of both infrastructure and local fish populations are at risk. An undersized or improperly placed culvert can impede or totally block fish and aquatic species from passing. Furthermore, debris tends to gather in under-sized culverts, forcing water to overtop roadways in a significant storm event. The expected service life of culverts is up to 50 years, so future as well as current streamflow must be considered in their design to ensure that they continue to function across their lifespan.

Road and other types of development can block passages for fish and other aquatic species. Well-designed culverts, such as those that are bottomless or partially buried into the substrate, help to connect habitats by simulating natural stream bottoms and providing for aquatic species movement.

Given the terrain within the study area, bottomless culverts are not always possible, especially when a culvert is used on a steep slope. Where this is the case, upsizing a culvert is recommended.

Bank Stabilization Along Rebuilt Roads

Stabilizing the river and streambanks while rebuilding roadway infrastructure is necessary. Constructing miles of retaining walls can be cost prohibitive. NCDOT is using riprap matrix to stabilize banks, which has little to no habitat value and does not help restore riparian zones.

Convenience Center & Recycling Center

Identify a suitable location for a convenience and recycling center that is central to Gerton and Bat Cave.

Support Private Road/Bridge Restoration through State Programs

Henderson County has its own standards based on building code for bridge design. However, North Carolina Emergency Management (NCEM) has programs to support private infrastructure recovery. If NCEM assistance is pursued, they have authorized two types of construction for private bridges: 1.) Steel stringer bridges with a timber deck; and 2.) concrete cored slab bridges.

The length of span can provide a rule of thumb for determining which bridge type to consider: for bridges up to 60 feet in length, a steel stringer bridge would be appropriate. For longer lengths, a concrete cored slab may be the better option for durability. Concrete bridges are more resilient due to concrete's anti-corrosive nature and reduced level of routine maintenance compared to steel stringers.

In addition to length, other factors such as cost and constructability must also be considered. Each bridge replacement requires analysis and design based on the existing conditions rather than a "one size fits all" approach to bridge replacement. For example, concrete bridge placement may require a crane, yet the terrain in some areas may not be able to support a crane. Therefore, a steel stringer bridge may be the best choice due to only needing a track hoe to excavate and set in place. A recovery program to help fund private bridge and private road repairs to be more resilient is recommended.

Regular Maintenance. Maintenance of roads, bridges and culverts once they are replaced is critical.

Culverts: In mountains areas, 85% of culvert failure is due to clogging from debris. (Gordon Rex Keller, PE, GE "Building Climate Resilience into Road Development").

Bridges: Scour is a common cause of bridge failure. Regular maintenance to identify and repair scour is critical to prevent bridges from getting dislodged.

Project Recommendations

Roads & Bridges

Roads and bridges were the top priority for residents of the area. Bearwallow Mountain Road was cited as blocking emergency access. Based on public comments, Middle Fork Road has failed repeatedly due to "mudslides". Many private bridges and driveways were destroyed or remain unrepaired. The following projects are recommended (or already in progress as noted) to address damage and support resiliency:

Middle Fork Road Reconstruction

Location: Middle Fork Road

Potential Key Stakeholder: NCDOT

Potential Partners: NCEM

General Cost: $$$$

Project Description: Reconstruct the road to address repeated mudslide failures mentioned by the public; consider permanent reroute (e.g., no hairpin turn).

Project Benefit: Prevents future closures, improves safety and reliability.

Private Bridge & Driveway Recovery Program

Location: Various private properties (e.g., Angelwood Lane, Reedy Ridge Rd, High Falls Rd)

Potential Key Stakeholder: NC Emergency Management

Potential Partners: Henderson County

General Cost: $$-$$$$

Project Description: Secure additional funding and technical support for private infrastructure restoration. This can also include assistance with the use of materials and techniques that will be more resilient to future flood events.

Project Benefit: Restores access, prevents displacement, supports equity.

Bearwallow Mountain Road Paving and Drainage Updates

This is a long-term recommendation (per community request). In order to pave Bearwallow Mountain Road, the base beneath the roadbed would need to be widened to construct stormwater drainage to fix the intense channelization at the edges of the roadway. In addition, the roadbed would need a more significant base. In order to bring this road to a condition to be paved, multiple private easements from property owners would need to be secured.

Potential Key Stakeholder: NCDOT

Potential Partners: Henderson County

Project Status: Resident request (NCDOT has noted that this corridor has considerable constraints and will be challenging).

Project Description: Provide full paving and drainage upgrades to ensure safe access for residents and emergency services. Upsize culverts to address consistent erosion and flooding issues

Project Benefit: Restores critical access, supports Fire/EMS, responds to top community priority.

US-74A River Road

Location: From Highway 9 in Bat Cave to Rutherford County and connecting to Chimney Rock, NC

Potential Key Stakeholder: NCDOT

Potential Partners: NC DOT, FEMA PA, FHWA

General Cost: $$$$

Project Status: In design - multimodal (greenway) accommodations have been requested.

Project Description: While NCDOT is reconstructing the roadway, advocate for a more resilient roadway with flood benches, upsized drainage, and wide shoulders. Connect to Chimney Rock's planned riverside path which will require additional engineering and coordination. Continue to advocate for multiuse sidepath accommodations between Bat Cave and Chimney Rock.

Project Benefit: Rebuilding the road in a way that supports riparian restoration and active transportation serves multiple goals while re-establishing this important road corridor.

Bridge, Culvert & Erosion Control Improvements

Location: Creeks throughout study area (e.g., Middle Fork, Hickory Creek, Reedy Patch Creek)

Potential Key Stakeholder: NCDOT

Potential Partners: Henderson County

General Cost: $$$

Project Description: Upgrade culverts and erosion control to protect driveways and prevent runoff damage. Investigate best practices for future improvements that will support long-term solutions.

Project Benefit: Protects private property, improves storm resilience.

Multimodal & Greenways

While sidewalks and bike lanes were rated lower in the survey, many residents requested safe bike/pedestrian paths along US 74, US 64, and river corridors. Currently US 64 cannot safely accommodate bicycle lanes therefore a recommendation regarding off road trail connectivity is for a feasibility study to be conducted. This is consistent with the French Broad River MPO (FBRMPO) CTP which included a recommendation for an off-road bicycle facility on US 64 (Chimney Rock Road) from Laycock Road to US 74A. This recovery plan does not recommend adding bicycle lanes to US 64 in its current condition. The focus of the recovery plan is for trail connectivity along the Rocky Broad River in Bat Cave to Chimney Rock where a path along the roadway can serve multiple goals including recreation, transportation, and extra room for emergency vehicles.

- Develop sidepaths or wide shoulders along US 74.
- Include bike/ped access in bridge designs (e.g., near cider mill).
- Coordinate with Conserving Carolina and French Broad River MPO.
- Connector trails to Florence Preserve and Wildcat Rock Trail.

US-74A Multimodal Sidepath

Location: US 74A corridor (Bat Cave to Chimney Rock)

Potential Key Stakeholder: NCDOT

Potential Partners: FBRMPO, Henderson County

General Cost: $$$$

Project Description: Connect to the proposed Chimney Rock Plan (Raise the Rock Action Plan) and connect to their proposed "Riverwalk" with a path adjacent to US 74A between Bat Cave and Chimney Rock. As this road gets re-built Henderson County can advocate and seek funding to integrate a path at the elevation of the roadway. Ensure use/access by EMS services.

Project Benefit: Improves safety by providing a separate facility for people walking and bicycling; supports recreation and emergency access. Placing this at the elevation of the roadway keeps the floodplain and infrastructure better protected from future flooding from storm events.

Explore Feasibility of Off-Road bicycle and pedestrian connection between Bat Cave and Edneyville

Location: Bat Cave to Edneyville, NC

Potential Key Stakeholder: Henderson County

Potential Partners: Conserving Carolina, NC Parks

General Cost: $$

Project Description: Conduct a paved trail feasibility study to determine if it is possible to create a continuous off-road greenway that connects Bat Cave and Edneyville.

Project Benefit: Supports health, recreation, community identity and tourism. Connects Bat Cave to the growth corridor in Hendersonville.

Recreation Connection

A path along US 74A as part of the Bat Cave Recreation Corridor would also provide recreation benefits for the community and visitors to the area

Emergency Preparedness Connection

Paths that can also accommodate emergency vehicles can help with access during an emergency.

Debris, Waste, & Sewer Infrastructure

Convenience Center & Recycling Center

Potential Key Stakeholder: Henderson County Solid Waste Department / Henderson County Government

Potential Partners: Henderson County Emergency Services; NCDEQ; NCDOT; Gerton and Bat Cave Volunteer Fire Departments; Local Landowners

General Cost: $$$

Project Description: Conduct a site suitability study and find a location to establish a convenience and recycling center in proximity to both Bat Cave and Gerton. The center would provide a safe, accessible location for solid waste, recycling, and debris management, reducing travel distances and improving post-disaster cleanup capacity. Incorporate resilient design, emergency access, and coordination with local fire departments and county agencies.

Project Benefit: Creates critical waste management infrastructure for routine and post-storm debris disposal, reduces illegal dumping, improves safety and environmental protection, and enhances community resilience and self-sufficiency within Hickory Nut Gorge.

Feasibility Study for Wastewater Utilities

Potential Key Stakeholder: Henderson County

Potential Partners: Land-of-Sky Regional Council and Mountain True

General Cost: $$$$

Project Description: Henderson County is focused on facilitating septic system repairs, but due to the loss of soil from the storm, some areas will no longer support any type of septic system. This project would explore the feasibility of extending sewer utilities from the east, along US 74A, to no further west than Hwy 9 in place of septic repair with the understanding that restrictions limiting future development would be adopted

Project Benefit: Creates critical waste infrastructure for areas with limitations to reestablish septic systems and to safeguard sewer utilities from future natural disasters.

Photo Credit: McGill & Associates

Section C: Emergency Preparedness

$ < 250K
$$ - 250-500K
$$$-500K-1M
$$$$-1M-3M
$$$$$ > 3M

PROJECT NAME	BRIEF DESCRIPTION OF PROJECT	PRIORITY (High, Medium, Low)	POTENTIAL KEY STAKEHOLDER	POTENTIAL PARTNERS	POTENTIAL COST
Strengthen Support for Fire Departments	Explore additional funding mechanisms, such as county-level adjustments to tax codes or dedicated emergency services funding programs. Integrate fire departments and emergency management specialists or planners early in planning and design processes for new or reconstructed infrastructure, such as roads, trails, and recreational amenities, to ensure adequate emergency access and response capabilities. Provide fire stations with the resources and emergency supplies to enhance their ability to serve as community emergency hubs.	High	Henderson County Emergency Services (Emergency Management, Fire Marshal, Emergency Medical Services) / Henderson County Government	Gerton Fire and Rescue Department, Bat Cave Volunteer Fire Department, North Carolina Office of State Fire Marshal (OSFM), Henderson County GIS and Planning Departments, North Carolina Emergency Management (NCEM), Local municipalities	$$-$$$
Explore Opportunities for a Landslide Early Response and Monitoring System	Collaborate with agencies such as the US Geological Survey (USGS), NC Geological Survey (NCGS) and other academic experts to position Hickory Nut Gorge for a pilot project for early Landscape Detection. Predicting any single landslide is not currently possible however tools like NASA's Landslide Hazard Model are being refined rapidly. Coupling these models with near real-time soil moisture sensor data will be the next big step in landslide forecasting.	High	Henderson County Emergency Services	NC Geological Survey, US Geologic Survey, NC Emergency Management, NCDOT, Bat Cave and Gerton Volunteer Fire Departments, regional universities and research centers (e.g., UNC Asheville, Appalachian State), climate research programs (e.g. modelers, data scientists	$$$$
Siren Alert System and Public Education Campaign	Install a network of outdoor sirens at strategic locations across Hickory Nut Gorge, prioritizing flood-prone and high-traffic areas such as Bat Cave, Chimney Rock Village, and Gerton. The sirens would be integrated with existing monitoring systems, including river and rainfall gauges, to automatically activate during critical flood events while minimizing the risk of false alarms.	Medium	Henderson County Emergency Services	Henderson County, NC Emergency Management, Bat Cave Fire Department, Gerton Fire and Rescue Department, National Weather Service (NWS), NC Department of Public Safety, FEMA (Hazard Mitigation Assistance), Chimney Rock Village, NC State Parks	$$–$$$
Explore Alternative Locations or Resilient Design Retrofits for the Bat Cave Volunteer Fire Department	Conduct a feasibility study to identify potential relocation sites outside of flood-prone areas, evaluating access routes to major roadways, and ensuring continued coverage across the department's service area. The study should also include an assessment and recommendations to identify ways that the current building and the land and river adjacent to the fire station can be reinforced, stabilized, or redesigned to withstand a future flood event.	Low	Henderson County Emergency Services	Henderson County Emergency Services, NC Office of State Fire Marshal, NCDOT, NC Emergency Management, FEMA Hazard Mitigation Assistance, Bat Cave Volunteer Fire Department, and Local landowners	$$$
Repair and Expand River and Rain Gauge Network	Repair the existing Rocky Broad River gauge and install new river and rainfall gauges at strategic points throughout Hickory Nut Gorge.	Low	USGS, NC Emergency Management	Henderson County Emergency Management, National Weather Service (NWS), NC Department of Environmental Quality (DEQ), Local fire departments, and American Whitewater	$$
Community Kiosk System for Emergency Communication	Establish community kiosks at the fire stations and community center(s) to share important emergency information with residents and visitors.	Low	Henderson County Emergency Services	Henderson County Government, Gerton Fire and Rescue Department, Bat Cave Volunteer Fire Department, NC Emergency Management, Local community organizations	$–$$

Overview

Emergency Preparedness is a fundamental component of a recovery plan, and the following recommendations are intended to supplement and support the ongoing efforts of Henderson County Emergency Services. It is recognized that Henderson County and its Emergency Services Department are working diligently at the county level to coordinate disaster recovery and to strengthen preparedness for future events. The recommendations presented in this plan are not meant to duplicate existing initiatives, but rather to provide additional, community-specific ideas and strategies that address the unique challenges experienced within the Hickory Nut Gorge during and after Tropical Storm Helene. These strategies aim to enhance communication, coordination, and local capacity to respond effectively in future emergencies.

General Summary

Tropical Storm Helene served as both a test and a catalyst for emergency preparedness in Hickory Nut Gorge. While local response efforts were largely successful (thanks to the dedication of fire departments, county agencies, and community networks) the event revealed critical opportunities to strengthen communication systems, infrastructure resilience, and coordination between agencies and residents. This plan does not evaluate how the county responded to the storm, but it does outline strategies to enhance readiness, build redundancy, and improve the Gorge's capacity to respond to future disasters.

The Hickory Nut Gorge is a relatively isolated area of Henderson County and due to the nature of the Gorge, infrastructure (roads & utilities) and structures are located near areas that flood and are susceptible to landslides. There are limited areas and opportunities within the Gorge that are not located on excessively steep slopes (less than 35%) or near the floodplain which is where the flatter land in the Gorge can be found. As a result, it may not be possible or desired by owners of damaged structures to relocate to areas beyond known hazard areas. Therefore, the following recommendations emphasize both infrastructure and community-based resilience, recognizing that preparedness is not only about equipment and systems but also about relationships, trust, and information sharing. Priorities include improving the reliability of emergency communications through siren and kiosk systems, expanding real-time data collection with river, rain, and landslide monitoring, and supporting the fire departments that form the backbone of emergency response in the region.

Equally important are the social and informational aspects of preparedness ensuring residents and visitors alike can access accurate, timely information before, during, and after an event. Proposed initiatives such as community kiosks, virtual communication platforms, and public education campaigns aim to strengthen local connections and ensure every household has the knowledge and resources to remain self-sufficient for at least 72 hours following a disaster.

Together, these initiatives form an integrated framework for emergency preparedness, one that blends technology with local knowledge, data with community action, and planning with implementation. By investing in these systems now, Hickory Nut Gorge can protect lives, safeguard infrastructure, and build a more resilient future capable of withstanding the next major natural disaster.

For the above preparedness elements, such as early warning systems and individual self-sufficiency, monitoring and predictive tools are needed to provide timely and accurate predictions that can be actioned. Several new technologies that utilize data monitoring, modelling, and artificial intelligence (AI) technology These tools aim to provide decision makers with earlier and more accurate predictions of disasters, so that communications, including evacuation orders—can be made timelier and confidently. Tools can be right-sized for the needs of the community and emergency responders and could range from a landslide or hydrologic focused tool or be expanded to include a broader scale Digital Twin which provides a dynamic, data-driven virtual model of a real-world system.

The Gerton Fire and Rescue Department and the Bat Cave Volunteer Fire Department serve as the backbone of emergency response in Hickory Nut Gorge. Both departments faced immense challenges following Helene, with already limited resources stretched thinner than ever. Even prior to the storm, these departments operated under constrained budgets due to the small and limited tax base within the Gorge. In addition to fighting fires, these organizations regularly conduct search and rescue operations for lost or injured hikers, making their continued capacity and preparedness vital to community safety and resilience.

General Thoughts

- Enhance existing communication channels and integrate into a broader county-wide information network to help ensure timely and consistent messaging before, during, and after emergencies. Both the Gerton Fire and Rescue Department and the Bat Cave Volunteer Fire Department maintain active Facebook pages that serve as valuable tools for public communication. Through these platforms, they share critical information such as hiking safety tips, defensible space guidelines for property owners, and updates on local conditions and community events.
- Integrate fire departments and emergency management specialists or planners early in planning and design processes for new or reconstructed infrastructure, such as roads, trails, and recreational amenities, to ensure adequate emergency access and response capabilities.
- Provide updated maps, data, and communication tools to both departments regularly, improving situation awareness and coordination.

"I saw all kinds of volunteers show up with side-by-sides and four-wheelers, truckloads of supplies which everybody in the community helped unload into the fire department, which became a supply hub for the entire community with everything that we could possibly need from baby diapers to toothbrushes."
— Collin Stanford, HNG Group Member

Project Recommendations

Strengthen Support for Fire Departments

Potential Key Stakeholder: Henderson County Emergency Services (Emergency Management, Fire Marshal, Emergency Medical Services) / Henderson County Government

Potential Partners: Gerton Fire and Rescue Department, Bat Cave Volunteer Fire Department, North Carolina Office of State Fire Marshal (OSFM), Henderson County GIS and Planning Departments, North Carolina Emergency Management (NCEM), Local municipalities (Town of Lake Lure, Edneyville Fire District, etc.), Local Community Organizations and HOAs

General Cost: $$-$$$

Project Description: Explore additional funding mechanisms, such as county-level adjustments to tax codes or dedicated emergency services funding programs. Integrate fire departments and emergency management specialists or planners early in planning and design processes for new or reconstructed infrastructure, such as roads, trails, and recreational amenities, to ensure adequate emergency access and response capabilities. Provide fire stations with the resources and emergency supplies to enhance their ability to serve as community emergency hubs.

Project Benefit: By investing in the capacity and coordination of fire departments, Hickory Nut Gorge can strengthen its emergency preparedness, improve response times, and enhance overall community resilience.

Community Connection

The fire departments served the important role of a community hub during topical storm Helene.

Landslide Early Response and Monitoring System

Potential Key Stakeholder: Henderson County Emergency Management

Potential Partners: NC Geological Survey, USGS, NC Emergency Management, NCDOT, Bat Cave and Gerton Volunteer Fire Departments, regional universities and research centers (e.g., UNC Asheville, Appalachian State), climate research programs (e.g. modelers, data scientists)

General Cost: $$$$

Project Description: Explore opportunities for a Landslide Early Response and Monitoring System by collaborating with agencies such as the US Geological Survey (USGS), NC Geological Survey (NCGS) and other academic experts to position Hickory Nut Gorge for a pilot project for early Landscape Detection. Predicting any single landslide is not currently possible however tools like NASA's Landslide Hazard Model are being refined rapidly. Coupling these models with near real-time soil moisture sensor data will be the next big step in landslide forecasting.

Given the steep slopes, geology, and heavy rainfall patterns in Hickory Nut Gorge, landslides are a persistent hazard, especially in the wake of tropical storms and intense precipitation events. Helene and associated rainfall-induced slope failures underscored the need for proactive monitoring and early-response capability.

A Landslide Early Response and Monitoring System could include:

- Site assessment and hazard mapping to identify high-risk slopes, particularly near transportation corridors, residential zones, and infrastructure.
- Installation of real-time sensors (soil moisture probes, tilt-meters, ground-movement detectors, rainfall gauges) at strategic locations to continuously track slope conditions.
- Integration of sensor outputs into predictive models and alert triggers, to detect when conditions approach critical thresholds (e.g., rapid change in subsurface moisture, ground displacement).
- Linking monitoring data to emergency systems and public alerts, enabling rapid communication to responders and residents when a landslide risk is rising.
- Public education and outreach, teaching residents about early warning signs (e.g. cracks in roads, tilting trees, ground subsidence) and safe response actions when alerts occur.

Critically, the system should incorporate big-data analytical techniques, machine learning, and model-driven forecasting approaches—drawing inspiration from research models like CLIMBS (kynsfepscor.uky.edu) and NASA's Landslide Hazard Assessment for Situational Awareness (LHASA) model, both of which leverage large environmental datasets and AI to predict climate hazards, floods, and landslides. (). By combining continuous sensor data with predictive analytics, the landslide system can anticipate slope failures before they occur, rather than simply reacting after damage has happened.

The LHASA and CLIMBS approaches emphasize three core functions:

- Develop Big Data: aggregating large, multi-source environmental and geospatial data streams (soil, hydrologic, climatic)
- Predict Disasters: applying AI / machine learning to forecast hazard events (floods, landslides) in real time
- Build Response Systems: concretely linking predictions to community-level early warning and mitigation systems

Project Benefit: By exploring and working with US Geological Survey (USGS) and NC Geological Survey (NCGS) Henderson County could position the Hickory Nut Gorge to be at the forefront of adopting a Landslide Early Response and Monitoring System that provides an adaptive, data-rich, and responsive, actionable warning system.

Siren Alert System and Public Education Campaign

Potential Key Stakeholder: Henderson County Emergency Services

Potential Partners: Henderson County, NC Emergency Management, Bat Cave Fire Department, Gerton Fire and Rescue Department, National Weather Service (NWS), NC Department of Public Safety, FEMA (Hazard Mitigation Assistance), Chimney Rock Village, NC State Parks

General Cost: $$$-$$$$

Project Description: Install a network of outdoor sirens at strategic locations across Hickory Nut Gorge, prioritizing flood-prone and high-traffic areas such as Bat Cave, Chimney Rock Village, and Gerton. The sirens would be integrated with existing monitoring systems, including river and rainfall gauges, to automatically activate during critical flood events while minimizing the risk of false alarms. The system should also be tied into county-wide emergency management networks for coordinated activation and maintenance. During Helene, widespread power outages and disrupted cellular and internet service left many residents and visitors in Hickory Nut Gorge without access to timely emergency information. In a region defined by steep terrain, scattered population centers, and limited communications infrastructure, a siren-based emergency alert system offers a crucial, redundant means of delivering life-saving warnings.

A siren alert system must function as part of a layered emergency warning system, complementing (not replacing) other communication methods such as wireless emergency alerts, social media, and community notification platforms. To ensure effectiveness, a comprehensive public education campaign should accompany system implementation. This campaign would inform residents, visitors, and local businesses about siren tones, what it means when they sound, and appropriate response actions. Educational efforts could include public service announcements, community workshops, and signage in key visitor destinations and recreation areas explaining what to do when a siren sounds.

Project Benefit: The installation of a siren alert system, coupled with a robust public education campaign, will enhance the Gorge's overall emergency preparedness and response capacity. Specific benefits include:

- Life safety: Provides rapid, widely audible alerts that do not rely on cell or internet service.
- Equitable communication: Reaches residents and visitors, including those without access to digital alerts.
- Enhanced coordination: Integrates with river gauges and existing emergency systems for seamless activation.
- Community resilience: Builds awareness and preparedness through proactive education and outreach.
- By combining audible alerts with community education, Hickory Nut Gorge can strengthen its early warning network, ensuring that residents and visitors receive timely, clear, and actionable information during future disasters.

Community Connection

A functioning and accessible fire department during a natural disaster can serve as a community hub.

Explore Alternative Locations or Resilient Design Retrofits for the Bat Cave Volunteer Fire Department

Potential Key Stakeholder: Henderson County Emergency Services

Potential Partners: Bat Cave Volunteer Fire Department, NC Office of State Fire Marshal, NCDOT, NC Emergency Management, FEMA Hazard Mitigation Assistance, Local landowners

General Cost: $$$-$$$$

Project Description: The Bat Cave Volunteer Fire Department is currently located in a low-lying area near the confluence of Hickory Creek and the Rocky Broad River which is in an area identified as flood-prone and increasingly vulnerable due to recent storm events. The facility was damaged directly during the storm and experienced flooding. After the storm, changes to the river alignment have increased the risk of even more impacts. Relocating the department to a less hazardous site is a proactive step to safeguard essential emergency operations and ensure uninterrupted response capabilities during disaster events. This project would involve conducting a feasibility study to identify potential relocation sites outside of flood-prone areas, evaluating access routes to major roadways, and ensuring continued coverage across the department's service area. Coordination with county Emergency Services (Emergency Management, Fire Marshal, Emergency Medical Services), the State Fire Marshal's Office, and potential funding partners will be key to identifying both a suitable site and funding mechanisms, such as FEMA's Hazard Mitigation Grant Program or state-level resilience grants.

The study should also include an assessment and recommendations to identify ways that the current building and the land and river adjacent to the fire station can be reinforced, stabilized, or redesigned to withstand a future flooding event. By evaluating the potential for a relocation and design retrofits as part of the study, a recommendation and understanding of the necessary financial investments can be evaluated, if the study determines if an alternative site in Bat Cave is possible.

Project Benefit: Relocating the Bat Cave Fire Department to a more resilient location or if possible, redesigning for improved resiliency would significantly strengthen the region's emergency preparedness and disaster response capacity. A new facility or reinforced facility would ensure reliable access during flood events, reduce risk to personnel and equipment, and maintain rapid emergency response for residents and visitors of Hickory Nut Gorge. Additionally, this investment would serve as a long-term mitigation measure, reducing potential recovery costs in future disasters and ensuring the safety and resilience of one of the Gorge's most vital community assets.

Community Connection

A functioning and accessible fire department during a natural disaster can serve as a community hub.

Repair and Expand River and Rain Gauge Network

Potential Key Stakeholder: USGS, NC Emergency Management

Potential Partners: American Whitewater, Henderson County Emergency Management, National Weather Service (NWS), NC Department of Environmental Quality (DEQ), Local fire departments

General Cost: $$-$$$

Project Description: Repair the existing Rocky Broad River gauge and install new river and rainfall gauges at strategic points throughout Hickory Nut Gorge. Prior to Tropical Storm Helene, a U.S. Geological Survey (USGS) river gauge was located on the Rocky Broad River at the US-64 Bridge in Bat Cave. This gauge played a crucial role in tracking river levels and providing early flood warnings to residents, emergency responders, and recreation users. The device was damaged and rendered inoperable during or after the storm, leaving a significant data gap for one of the most flood-prone areas of the Gorge.

Repairing the existing Rocky Broad River gauge should be a top priority to restore timely and accurate hydrologic monitoring in the area. In addition, installing new river and rainfall gauges at strategic points throughout Hickory Nut Gorge would greatly enhance local flood forecasting and emergency preparedness. Potential new sites include key tributaries such as Hickory Creek and Reedypatch Creek, and near known low-lying or high-risk road crossings.

These gauges should be equipped with real-time telemetry and connected to regional alert systems, such as the National Water Dashboard, NWS flood forecasting models, and county emergency management networks. Data collected can also be made publicly accessible through web and mobile interfaces to support both emergency services and community awareness.

Project Benefit: Repairing and expanding the river and rain gauge network will provide accurate, real-time data to inform emergency decision-making, support flood warnings, and protect public safety. Specific benefits include:

- Improved early warning systems for residents and responders during high-water events.
- Reliable, up-to-date water level data to inform river access decisions for paddlers, anglers, and other recreation users.
- Enhanced coordination among local fire departments and Emergency Services (Emergency Management, Fire Marshal, Emergency Medical Services) through shared access to live hydrologic data.
- Long-term resilience through data-driven planning, infrastructure design, and hazard mitigation.

Community Kiosk System for Emergency Communication

Potential Key Stakeholder: Henderson County Emergency Services

Potential Partners: Henderson County Government, Gerton Fire Department, Bat Cave Volunteer Fire Department, NC Emergency Management, Local community organizations

General Cost: $

Project Description: Establish community kiosks at the fire stations and community center(s) to share important emergency information with residents and visitors. This would provide a vital method of sharing important emergency information with residents and visitors, especially in areas where cell service or internet connectivity is limited. While these kiosks would serve as community communication hubs during normal conditions, they could also function as reliable information points for emergency response and preparedness. Coordination with local emergency services would ensure information remains up-to-date and relevant, while community volunteers could assist with maintenance and posting updates.

Each kiosk could feature a combination of permanent and changeable displays, providing clear and accessible information such as:

- Emergency contact information and key phone numbers
- Steps to take during floods, landslides, or severe weather events
- Preparedness tips (e.g., maintaining 72 hours' worth of food, potable water, and emergency supplies)
- Updates from local fire departments, EMS, or county emergency management
- Potential evacuation routes and shelter locations

Project Benefit: Implementing a community kiosk system would enhance communication, awareness, and preparedness throughout Hickory Nut Gorge. Specific benefits include:

- Reaches residents and visitors without reliable internet or cell access through a visible, physical information network.
- Provides consistent, verified emergency guidance across multiple locations.
- Strengthens community resilience and trust through proactive and transparent information sharing.
- Supports both daily community engagement and disaster readiness by serving dual functions year-round.
- By integrating community kiosks into the broader emergency communication network, Hickory Nut Gorge can ensure critical information reaches everyone, fostering a safer, more informed, and more connected community.

Section D: Recreation

$ < 250K
$$ - 250-500K
$$$-500K-1M
$$$$-1M-3M
$$$$$ > 3M

PROJECT NAME	BRIEF DESCRIPTION OF PROJECT	PRIORITY (High, Medium, Low)	POTENTIAL KEY STAKEHOLDER	POTENTIAL PARTNERS	POTENTIAL COST
RIVER ACCESS & BLUEWAY					
Bat Cave Recreation Corridor (along the Rocky Broad River/74A from the county line to the intersection of Hwy 9 in Bat Cave)	A continuous pathway with river restoration that includes river access (fishing, paddling, swimming), and trailheads/parking.	High	Henderson County	Henderson County Soil & Water, Riverlink, NCDEQ, NCDOT, and NC State Parks	$$$$$
Rocky Broad River Access Area in Bat Cave	Provide safe river access & managed parking.	Medium	Private/County, American Whitewater	Outfitters, NC Parks, NCWRC	$$
Hickory Creek Access in Gerton	Provide safe river access & managed parking in connection with a potential restoration of Hickory Creek in this location.	Low	Private/County, American Whitewater	Outfitters, NC Parks	$$
PARK AND COMMUNITY GREEN SPACE					
Community Park & Memorial Garden	Utilize existing space at the former community center to create a simple nature-based playground where the community could access streams and connect with each other.	High	Henderson County Parks & Recreation	Upper Hickory Nut Gorge Community Center (non-profit), Conserving Carolina, Community Foundation of Henderson County, local civic groups, NC Arts Council	$$
Hickory Nut Gorge Regional Recreation Plan: Henderson & Rutherford Counties	Collaborate with others to develop a plan for outdoor access for trails and river experiences across the Gorge.	High	NC Commerce Rural Economic Development and Office of Outdoor Economy	Henderson County, Rutherford County, Conserving Carolina, NC State Parks, Land of Sky Regional Council	$
Rocky Broad River Park	Create a park with pathway, parking, river access, river restoration and stormwater management.	Low	Henderson County Recreation Department	Conserving Carolina, Community Foundation of Henderson County, NCDOT, NC State Parks, American Whitewater	$$$-$$$$
TRAILS					
Extend Hickory Nut Gorge State Trail	Continue implementing sections of state trail that link Bearwallow Mountain, Blue Ridge Pastures, Florence Nature Preserve, Chimney Rock State Park and other areas beyond the Henderson County line.	Medium	Conserving Carolina	NC State Parks	$$-$$$
Wildcat Rock & Florence Preserve Resilient Trails	Repair washed out trails with safe crossings; add wildfire fuel breaks and emergency access.	Low	Conserving Carolina	NC Forest Service, Bat Cave Volunteer Fire Department, Gerton Fire and Rescue Department	$$
Install a New Bridge for Wildcat Rock Trail	Install a new pedestrian bridge to connect to the trail system.	Low	Conserving Carolina	Henderson County Parks & Recreation, Fire Department	$
Improve trail access and pedestrian connections	Improve trail access between Strawberry Gap and the Florence Nature Preserve adjacent to Little Pisgah Road.	Low	Conserving Carolina	Henderson County Parks & Recreation, Fire Department	$

General Summary

The Hickory Nut Gorge is defined by its unique ecological, scenic qualities, rugged and steep terrain and numerous waterways cutting through the Gorge, which provides extraordinary outdoor experiences for river paddling, hiking, climbing, fishing, and scenic drives. Tropical Storm Helene left trails washed out, access points unsafe, and tourism-dependent businesses struggling. Residents and visitors want to return to the river and trails, but in safer ways that respect floodplains and steep slopes. The County's Greenway Master Plan suggests using sustainable building methods to link communities through trails and greenways in the floodplain where feasible. Due to the features that make Hickory Nut Gorge unique, there are limited opportunities for wide greenway paths. In many instances, the Gorge may be better served by narrower pathways or hiking trails. Rebuilding recreational assets can support the local economy and the wellbeing of the residents of Hickory Nut Gorge. Outdoor recreation supports local jobs and tourism and gives residents back their landscape - while helping manage risk through natural buffers and fire-adapted corridors. Due to the stresses that outdoor recreation can have on local fire and rescue, as new trails and recreational facilities are provided, consideration for emergency access and funding for local fire departments should be given when developing or rebuilding recreational assets.

General Thoughts

- Restore and expand safe outdoor access by converting damaged or high-risk parcels (floodplain areas or FEMA buyout parcels) into passive recreational uses. Passive recreation includes low impact on natural resources, limited infrastructure development, informal uses and is nature focused. Examples can include open green space with a walking trails, parks with places to picnic and enjoy nature, river access points, and greenways.
- Design and repair recreational amenities with safe crossings and sustainable slope stabilization (e.g., Wildcat Rock Trail, Florence Nature Preserve, and Bearwallow Mountain Trail) to enhance emergency access, public access, and ecological function.
- Integrate hazard mitigation and resiliency into recreation – natural surface trails with riparian buffers, trails that serve as wildfire fuel breaks, floodable parks and pathways, and locating recreation related structures further away from the edge of the riverbanks.
- Leverage outdoor recreation as a place-based economic development strategy and a way to enhance quality of life for locals and visitors.
- Partner with key stakeholders to align restoration and recreation goals while working with Gerton Fire and Rescue Department and the Bat Cave Volunteer Fire Department to address concerns for emergency access.

Bat Cave Recreation Corridor & Rocky Broad River Park

The artist's conceptual rendering of the Bat Cave Recreation Corridor is a visualization to share the possibilities for what this area could look like. Any future planning, design or engineering would include the landowner's involvement and approval.

Project Recommendations

River Access & Blueway

The Rocky Broad River is a significant natural asset that attracts locals and visitors to the river. A systemwide Blueway that includes managed river access on FEMA buyout lands can include parking, signage, information kiosks, bank stabilization and river restoration (to protect public safety, infrastructure and habitat), and river access for fishing and paddling.

Bat Cave Recreation Corridor

Location: Along the Rocky Broad River/US 74A from the county line to the intersection of Hwy 9 in Bat Cave.

Potential Key Stakeholder: Henderson County

Potential Partners: Henderson County Soil & Water, Riverlink, NCDOT, NC State Parks, NC Department of Environmental Quality (NCDEQ)

General Cost: $$$$

Project Description: Create a continuous pathway with river access (fishing, paddling, swimming) and trailheads/parking in conjunction with river restoration. Careful consideration should be given to the proximity of the pathway to the river to allow for the reestablishment of riparian vegetation which plays a significant role in the riverbank's stability. Another important consideration is the material selection for the pathway which is often paved as minimizing impervious surfaces adjacent to the river is recommended. Recreational amenities should be based on available land including stabilized and rebuilt riverbanks. Where possible, pull-offs should also be provided near river access locations. The terminus of this recreation corridor should be a destination such as a new park (Rocky Broad River Park) close to the intersection of US 74A and Hwy 9 in Bat Cave. This project will also connect to the Chimney Rock Recovery Plan (Raise the Rock) which has a strong emphasis on river recreation and a riverwalk. Due to spatial limitations, a side path adjacent to the road may be more feasible than a greenway or "riverwalk" located closer to the river. A key component of this project would be the establishment of a riparian buffer and ecological restoration of the river.

Project Benefit: This project will support tourism, recreation, and community identity. It repurposes floodplain areas along the Rocky Broad River for passive recreational uses that boost tourism, provide safe river access, establish riparian corridors that serve as a flood buffer and habitat restoration, and create recreational opportunities for the local community.

Environment Connection

Restoration of the Rocky Broad River is a critical aspect in developing this recreation corridor.

Emergency Preparedness Connection

Can provide access for emergency vehicles for swift water rescue.

Community Connection

A safe place to walk and recreate is a benefit to the health and wellness of the community.

Tourism & Economy Connection

This corridor could attract visitors and provide a safe place to park along US 74A.

Environment Connection

By restoring sections of the Rocky Broad River access to the river can also be provided.

Recreation Connection

River access would be part of the larger Bat Cave Recreation Corridor.

Rocky Broad River Access Area in Bat Cave

Location: Along the river at a point across from Saylor Lane to an area near Riverside Retreat.

Potential Key Stakeholder: Private/County, American Whitewater

Potential Partners: Outfitters, NC Parks, NCWRC

General Cost: $$

Project Description: Safe river access & managed parking. This could be a project within the Bat Cave Recreational Corridor or a stand-alone project.

Project Benefit: Fishing and river access for residents and visitors.

Environment Connection

By restoring sections of the Hickory Creek access to the creek can also be included.

Hickory Creek Access in Gerton

Location: Creekside Mountain Camping

Potential Key Stakeholder: Private/County, American Whitewater

Potential Partners: Outfitters, NC Parks

General Cost: $$

Project Description: Safe river access & managed parking in connection with a potential restoration of Hickory Creek in this location.

Project Benefit: Fishing and river access for residents and visitors.

Park and Community Green Space

Community parks and green spaces offer numerous valuable benefits, including promoting health and wellness, providing play areas, and creating spaces for social connection. Reclaiming safe sites for public use can involve developing parks of various sizes—such as small pocket parks and gathering nodes—connected to community hubs and trailheads. Damaged or high-risk properties, like those in floodplains or FEMA buyout areas, can be transformed into passive parks with minimal infrastructure. These spaces can also support river or stream restoration and incorporate nature-based stormwater management solutions.

Community Park & Memorial Garden

Location: Former Upper Hickory Nut Gorge Community Center site

Potential Key Stakeholder: Upper Hickory Nut Gorge Community Center Nonprofit

Potential Partners: Upper Hickory Nut Gorge Community Center (non-profit), Conserving Carolina, Community Foundation of Henderson County, local civic groups, NC Arts Council

General Cost: $$

Project Description: Utilize existing space at the former community center to create a memorial garden and space for the community to gather, with benches, native landscaping, and interpretive signage honoring the heroism of the community during and after Tropical Storm Helene. Establish native vegetation in parts of the footprint along the riparian corridor and restore the banks of Hickory Creek. The adjacent property on the opposite side of Kelly Hill Road that is also owned by the nonprofit could include other recreational amenities for multiple age groups, including a community playground and nature park with a walking trail.

Project Benefit: Small projects that can be built quickly to show the community recovery is progressing are very important. This project could serve this role, providing the community with a space for coming together and for healing.

Community Connection

A park and memorial garden can be part of the reestablishment of the Upper Hickory Nut Gorge Community Center.

Hickory Nut Gorge Regional Recreation Plan: Henderson & Rutherford Counties

Location: Hickory Nut Gorge from Gerton to Lake Lure

Potential Key Stakeholder: NC Commerce Rural Economic Development and Office of Outdoor Economy

Potential Partners: Henderson County, Rutherford County TDA, Conserving Carolina, NC State Parks, Land of Sky Regional Council

General Cost: $

Project Description: Collaborate with others to develop a plan for outdoor access for trails and river experiences across the Gorge. A Hickory Nut Gorge Regional Recreation Plan would unite Henderson and Rutherford counties to create a shared vision for outdoor access for trails and river access. The plan would coordinate local, county, and state partners to support place-based economic development, bolster small businesses tied to outdoor recreation, enhance residents' quality of life, and deliver a seamless visitor experience.

Project Benefit: By aligning jurisdictions and funding strategies, the plan would attract state and federal investment, reduce fragmented development, and increase resilience through nature-based infrastructure. It would boost tourism revenue while protecting sensitive landscapes, create stronger markets and year-round demand for local outfitters, shops, and guides, and improve safety and sustainability for both residents and visitors.

Tourism & Economy Connection

A regional recreation plan that is implemented can help support local business that provide services to locals, visitors, and tourists.

Rocky Broad River Park

Location: To the east of the confluence of the Rocky Broad River & Hickory Creek

Potential Key Stakeholder: Henderson County Parks & Recreation Department

Potential Partners: Conserving Carolina, Community Foundation of Henderson County, NCDOT, NC State Parks, American Whitewater

General Cost: $$$-$$$$

Project Description: Create a park with pathway, parking, river access, river restoration and stormwater management. This is one of only a few locations that could accommodate a small park with some limited parking and river access. Due to the location of this potential park at the confluence of two water courses, this park will flood in the future and only passive park elements that can withstand periodic flooding should be included. Small parking areas, safe river access for fishing and paddling, and pull-offs could be included. This park would be one part of the larger Bat Cave Recreation Corridor.

Environment Connection

A park project along the Rocky Broad River should include restoration and stormwater management such as constructed wetlands.

Project Benefit: This is the location for a proposed restoration of a section of the Rocky Broad River. The project could reduce trespass for river access on private property, allow tourists to pull off and park to minimize traffic impacts to residents, provide locals a place to access the river, and support the outdoor recreation tourism economy. River restoration and stormwater management utilizing nature-based design should also be integrated into the park project for additional benefits to the community.

Trails

Trails in this scenic area of Henderson County provide health and wellness opportunities for residents and can contribute to sustaining or building tourism and supporting local business. Numerous trails were impacted from the storm and there are many needs such as rebuilding trail crossings, rerouting trails away from unstable slopes, integrating wildfire fuel breaks, and natural surface trails throughout the challenging terrain of the Gorge. New trails should consider emergency services and points of access to make it easier for injured or distressed trail users to be located. Explore trail and greenway connections that are not located in hazard prone areas such as immediately adjacent to rivers and landslide prone areas. Explore the long-term feasibility of greenways, bike lanes, shoulders, or sidepaths adjacent to the road network along 64 (Bat Cave to Edneyville), US 74A (Bat Cave to Gerton), and Hwy 9 (North of Bat Cave). Greenways and multimodal recommendations are addressed in the Infrastructure chapter.

Extend Hickory Nut Gorge State Trail

Location: Hickory Nut Gorge

Potential Key Stakeholder: Conserving Carolina

Potential Partners: NC State Parks

General Cost: $$-$$$ (will depend on section mileage and location)

Project Description: Continue implementing sections of the state trail that links Bearwallow Mountain, Blue Ridge Pastures, Florence Nature Preserve, Chimney Rock State Park and other areas beyond the Henderson County line. This is a proposed 100+ mile state trail that links Bearwallow Mountain, Blue Ridge Pastures, Florence Nature Preserve, Chimney Rock State Park and other areas beyond the Henderson County line. Currently, more than 38 miles of trails are accessible by the public.

Project Benefit: Natural surface trails will be located away from the floodable areas along the river and stream system in the Gorge. As envisioned, this trail system is expected to become a significant community and regional asset akin to the Mountains-to-Sea Trail. It will benefit both the local community that enjoy hiking on trails as well as the outdoor recreation economy. This type of trail system, if designed based on sustainable trail techniques, can help maintain the natural character of the region due to the trails' small footprint on the landscape.

Community Connection

Trails can provide health and wellness benefits to the local community.

Tourism & Economy Connection

A state trail can attract recreation enthusiasts to the area.

Wildcat Rock & Florence Preserve Resilient Trails

Location: Gerton/Bearwallow

Potential Key Stakeholder: Conserving Carolina

Potential Partners: NC Forest Service, Bat Cave Volunteer Fire Department, Gerton Fire and Rescue Department

General Cost: $$

Project Description: Repair washed out trails with safe crossings; add wildfire fuel breaks and emergency access.

Project Benefit: Repairs that are built on sustainable trail design techniques will be resilient to future natural disasters.

Community Connection

Trails can provide health and wellness benefits to the local community.

Install a New Bridge for Wildcat Rock Trail

Location: Near the entrance of Florence Preserve along US 74A

Potential Key Stakeholder: Conserving Carolina

Potential Partners: Henderson County Parks & Recreation, Fire Department

General Cost: $

Project Description: A new pedestrian bridge to connect to the trail system.

Project Benefit: Improve trail access and pedestrian connections

Community Connection

Trails can provide health and wellness benefits to the local community.

Improve Trail Access and Pedestrian Connection off Little Pisgah Road

Location: Trail connection off Little Pisgah Road

Potential Key Stakeholder: Conserving Carolina

Potential Partners: Henderson County Parks & Recreation, Gerton Fire Department

General Cost: $

Project Description: Improve trail access between Strawberry Gap and the Florence Nature Preserve adjacent to Little Pisgah Road.

Project Benefit: Improved trail access and pedestrian connections for public safety and accessibility.

Community Connection

Trails can provide health and wellness benefits to the local community.

Photo Credit: Conserving Carolina

Section E: Community

$ < 250K
$$ - 250-500K
$$$-500K-1M
$$$$-1M-3M
$$$$$ > 3M

PROJECT NAME	BRIEF DESCRIPTION OF PROJECT	PRIORITY (High, Medium, Low)	POTENTIAL KEY STAKEHOLDER	POTENTIAL PARTNERS	POTENTIAL COST
Reestablish the Upper Hickory Nut Gorge Community Center	Reestablish a new community center building in a safe, accessible, and hazard-resilient location.	High	Upper Hickory Nut Gorge Community Center	Dogwood Health Trust, Community Foundation of Western North Carolina, Henderson County Emergency Services, Mountain BizWorks, Henderson County Government, local civic groups	$$$
Develop a Bat Cave Community Center	Establish a new community center in a safe, accessible, and hazard-resilient location.	Medium	Henderson County Government (in partnership with local community leadership)	Dogwood Health Trust, Community Foundation of Western North Carolina, Henderson County Emergency Services, Mountain BizWorks (for business incubation), local nonprofits, and civic organizations	$$$
Develop a Virtual Communication Platform for Community Engagement	Establish a formal, county-supported virtual communication platform to serve as a centralized hub for two-way engagement between residents, local governments, and emergency services	Low	Henderson County Government	Henderson County Emergency Services, Henderson County IT Department, Public Information Office, local municipalities, and community representatives	$-$$
Community Foundation Recovery Fund	Develop a new fund specifically for HNG to help with long-term recovery project through The Community Foundation in partnership, with the County.	Low	Community Foundation of WNC	Henderson County	N/A

"It is so easy to take the things in life we count on every day for granted."
— Ann Albright, HNG Group Member

"Community was important before the storm. Community has been essential to recovery."

– Community survey response

General Summary

In the aftermath of the storm, many traditional community gathering spaces—both physical and virtual—were lost, creating significant barriers to communication, coordination, and connection among residents. Access to timely, accurate, and inclusive information is essential at every stage of recovery, and the ability to share that information through trusted local networks is equally critical.

To strengthen long-term recovery and resilience, new and revitalized community spaces can be established to serve as safe, accessible venues for residents to gather, exchange information, and participate in decision-making. These spaces play a vital role in rebuilding social bonds, fostering civic engagement, and restoring a shared sense of belonging.

The loss of the Upper Hickory Nut Gorge Community Center, a long-standing hub for community events, including over six decades of monthly community dinners, illustrates the deep impact such losses have on the fabric of community life. Its absence underscores the importance of intentionally reinvesting in multi-purpose community hubs that support both everyday connection and coordinated disaster recovery.

General Thoughts

- Establish new and revitalized community spaces to serve as community hubs.
- Create multi-purpose community hubs for dual uses: serving as centers for communication, education, and social connection in normal times, and as community communication and resource hubs during emergencies. When equipped with backup power, potable water, emergency supplies, and reliable communication systems, these hubs can become trusted lifelines for information-sharing and support during future disaster events.

Project Recommendations

Community Centers for Gerton and Bat Cave

It is recommended that each community identify and establish a designated Community Center to serve as a central, accessible location for disaster preparedness, response, and recovery. These hubs should be strategically located within each community, ensuring rapid access during emergencies.

Each Community Center should be equipped and organized to function as a primary gathering space and coordination center for residents, local government representatives, first responders, and volunteer emergency services during a disaster event. Beyond serving as emergency response centers, these hubs should remain active and visible in the community year-round, hosting preparedness training, recovery planning, and educational programs that strengthen community readiness – as well as provide spaces for community building activities such as community dinners and events.

To be effective, Community Resilience Hubs must be well-publicized and integrated into local emergency management plans, ensuring that community members and response partners are familiar with their location and role long before a disaster occurs.

Reestablish the Upper Hickory Nut Gorge Community Center

Potential Key Stakeholder: Upper Hickory Nut Gorge Community Center (nonprofit)

Potential Partners: Dogwood Health Trust, Community Foundation of Western North Carolina, Henderson County Emergency Services, Mountain BizWorks, Henderson County Government, local civic groups

General Cost: $$$-$$$$

Project Description: Reestablish a new community center structure or building in a safe, accessible, and hazard-resilient location. The loss of the Upper Hickory Nut Gorge Community Center during Tropical Storm Helene removed a long-standing cornerstone of local identity and connection. For decades, the Center served as a gathering place for community events, meetings, celebrations, and outreach, providing both social cohesion and practical support for residents.

Reestablishing a new community center in a safe, accessible, and hazard-resilient location is critical to restoring that sense of place and strengthening long-term community resilience.

The new facility should either involve the construction of a new building or the rehabilitation of an existing structure outside of high-risk areas, such as floodplains or landslide-prone slopes. The site should be centrally located within the Gorge, easily reachable by Gerton residents, while remaining above known hazard zones.

To serve both everyday and emergency needs, the facility should include:

- Open and flexible meeting spaces for gatherings, programs, and workshops.
- Restroom facilities and accessible amenities to accommodate diverse users.
- Coordinate with the Fire Departments to be able to have supplies and be prepared for an emergency.
- Reliable power and communication infrastructure, such as backup generators or solar arrays, to ensure operability during outages.
- Outdoor community space, if feasible, to host farmers markets, resource fairs, or cultural events that strengthen local engagement.

The center could also serve as a Community Resilience Hub, partnering with Henderson County Emergency Services to provide a trusted site for distributing information, recovery resources, and assistance during future disasters. Collaboration with Dogwood Health Trust, Mountain BizWorks, and the Community Foundation of WNC could help develop business incubation, wellness programming, and economic resilience initiatives within the space.

Project Benefit: Reestablishing the Upper Hickory Nut Gorge Community Center would provide both tangible and social benefits for residents, including:

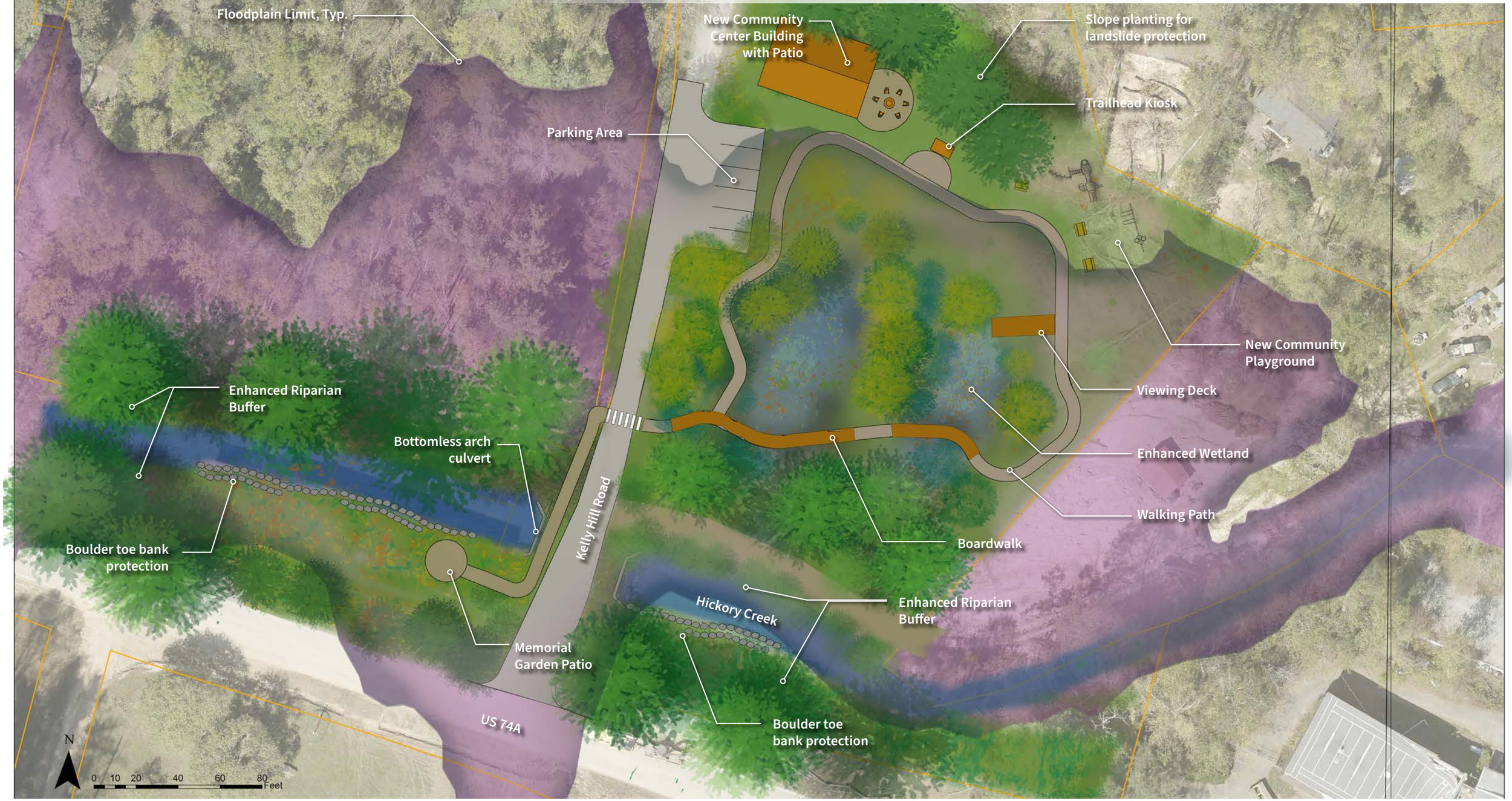
- Restored sense of community connection and identity through a shared physical gathering space.
- Reliable hub for emergency coordination, resource distribution, and communications during future disaster events.
- Increased access to programs and services that promote social, economic, and environmental resilience.
- Long-term investment in community health and preparedness, ensuring the Gorge has a safe and inclusive space for all residents.
- By reestablishing the Upper Hickory Nut Gorge Community Center in a safer, more resilient location, the community can reclaim a vital gathering place, one that honors its past while preparing for a stronger and more connected future.

Emergency Preparedness Connection

The Community Center can serve as another hub during an emergency

Upper Hickory Nut Gorge Community Center & Nature Park

The artist's conceptual rendering of the Upper Hickory Nut Gorge Community Center & Nature Park is a visualization to share the possibilities for what this area could look like. Any future planning, design or engineering would include the landowner's involvement and approval.



Develop a Bat Cave Community Center

Potential Key Stakeholder: Henderson County Government (in partnership with local community leadership)

Potential Partners: Dogwood Health Trust, Community Foundation of Western North Carolina, Henderson County Emergency Services, Mountain BizWorks (for business incubation), local nonprofits, and civic organizations

General Cost: $$-$$$

Project Description: Establish a new community center in a safe, accessible, and hazard-resilient location. The Bat Cave community lacks a central gathering space that can serve both everyday needs and emergency response functions. Establishing a Community Center in Bat Cave would fill this critical gap—providing a dedicated, flexible space for residents to connect, access resources, and organize during both normal times and crises.

Modeled after the Swannanoa Resilience Hub and informed by examples from the Climate Safe Housing Network, this facility would embody the principles of Community Care, Collaboration, and Connection. It would act as a safe, inclusive, and adaptive space designed to build social cohesion and strengthen resilience before, during, and after disasters.

A feasibility study should be conducted to identify potential sites in safe, accessible locations—outside of flood-prone and landslide hazard zones, yet close enough to serve the wider Hickory Nut Gorge population. Depending on available assets, the hub could be developed through adaptive reuse of an existing building (such as a former civic, commercial, or faith-based structure) or construction of a new facility specifically designed for community use.

Core functions and essential components of a Bat Cave Community Center could include:

- Community meeting and gathering spaces for educational programs, resource fairs, and local events.
- Emergency coordination point equipped with backup power, communications, and storage for disaster response supplies.
- Resource and information center providing access to recovery assistance, preparedness materials, and health or social services.
- Co-working or incubation area supported by partners like Mountain BizWorks to foster local entrepreneurship and small business recovery.
- Outdoor community area for farmers markets, mutual aid events, and informal gathering.
- Accessible design to ensure inclusion of all residents.
- The development of this hub would align with regional resilience goals by strengthening local capacity for communication, collaboration, and rapid response. It could also serve as a pilot project for a network of community hubs across the Gorge, building redundancies and improving coverage for all nearby communities.

Project Benefit: A Bat Cave Community Center would serve as both a daily gathering place and a lifeline during emergencies, improving overall community resilience and connectedness. Specifically, it would:

- Enhance social cohesion by creating a visible and inclusive space for residents to come together.
- Support disaster recovery and preparedness through on-site emergency coordination and information sharing.
- Provide equitable access to vital resources, information, and services for those without reliable internet or transportation.
- Foster local leadership and collaboration between residents, nonprofits, and agencies.
- Strengthen long-term community resilience by integrating preparedness, sustainability, and care into everyday life.
- By developing a community hub in Bat Cave, Henderson County can build on proven regional models of resilience, ensuring that residents have a trusted, accessible space to connect, prepare, and recover together.

Emergency Preparedness Connection

The Community Center can serve as another hub during an emergency

Develop a Virtual Communication Platform for Community Engagement

Potential Key Stakeholder: Henderson County Government

Potential Partners: Henderson County Emergency Services, Henderson County IT Department, Public Information Office, local municipalities, and community representatives

General Cost: $-$$

Project Description: Establish a formal, county-supported virtual communication platform to serve as a centralized hub for two-way engagement between residents, local governments, and emergency services. Effective and transparent communication is critical for community resilience, especially in a region like Hickory Nut Gorge where geographic isolation and limited infrastructure can make information-sharing difficult during emergencies. Currently, most local communication occurs informally through resident-managed Facebook groups and neighborhood networks. While these online communities have proven resourceful, particularly during Helene, they rely heavily on volunteer effort and may not always be sustainable long-term.

This digital platform could take the form of a dedicated Hickory Nut Gorge Community Portal or a subpage of the County's existing emergency management website, designed specifically for community updates, resource sharing, and feedback.

Key features could include:

- Centralized information sharing: A single, authoritative space for posting updates from Henderson County, emergency management, volunteer fire departments, and partner organizations.
- Two-way communication tools: Message boards, surveys, or comment forms to allow residents to share feedback, ask questions, and raise local concerns.
- Emergency alerts and preparedness resources: Integration with countywide emergency systems and river gauge data to provide real-time hazard updates, evacuation notices, and safety guidance.
- Community resource directory: Links to recovery assistance, volunteer opportunities, and small business or housing support programs.
- Mobile-friendly interface: Accessible on phones and tablets for residents without broadband access.
- This platform should be managed collaboratively between Henderson County Emergency Services and community representatives to ensure accuracy, timeliness, and relevance. Regular moderation and clear guidelines will help maintain trust and civility while ensuring information remains consistent and credible.

Project Benefit: By developing a centralized, accessible communication platform, Henderson County can ensure that residents of Hickory Nut Gorge are informed, connected, and confident in their ability to prepare for and recover from future challenges. A formal virtual communication platform would strengthen community connection, transparency, and preparedness in Hickory Nut Gorge. Specific benefits include:

- Creates a single, reliable source of information for residents and visitors, reducing confusion during emergencies or recovery.
- Builds trust between residents and government agencies through open, transparent communication.
- Supports self-recovery and empowerment by providing consistent updates, resources, and opportunities for collaboration.
- Improves emergency coordination and reduces misinformation spread on social media.
- Promotes long-term civic engagement by offering a space for residents to stay involved in planning, recovery, and community initiatives.

Emergency Preparedness Connection

This communication platform can help convey important information prior to, during or after emergency.

Community Foundation Recovery Fund

Potential Key Stakeholder: Community Foundation

Potential Partners: Henderson County

General Cost: N/A

Project Description: Develop a new fund specifically for Hickory Nut Gorge to help with long-term recovery projects through the Community Foundation in partnership with the County.

Project Benefit: Financial assistance to help residents and business recover.

Housing & Affordability Connection

Funding to help locals rebuild

Section F: Land Use

$ < 250K
$$ - 250-500K
$$$-500K-1M
$$$$-1M-3M
$$$$$ > 3M

PROJECT NAME	BRIEF DESCRIPTION OF PROJECT	PRIORITY (High, Medium, Low)	POTENTIAL KEY STAKEHOLDER	POTENTIAL PARTNERS	POTENTIAL COST
Hazard Mapping	Map hazard areas that include floodplains, landslide-prone slopes, potential debris flow pathways, and riparian corridors to identify suitable areas for land development.	Low	Henderson County	Land of Sky Regional Council, NCEM, Grassroot Organizations	$$
Strategic Buyout Parcel Reuse Plan	Develop a plan for buyouts and other acquisitions of the most hazardous areas along the floodplain so there's continuity in the land that will become open space and used to lessen the impact of future natural disasters. Repurpose buyout parcels for passive recreation*, greenways, or conservation.	Low	Henderson County	FEMA, Conserving Carolina, Trust for Public Land, Community Foundation of Henderson County, Land of Sky Regional Council	$–$$
Resilient Building Code	Have the County encourage and educate landowners and developers to utilize more environmentally sustainable/resilient materials (flood resilient materials), designs (firewise landscaping), and construction practices (elevating foundations) that go beyond state building code requirements.	Low	Henderson County Building Services	NCEM, APA NC Chapter, Land of Sky Regional Council	$

**Passive recreation includes low impact on natural resources, limited infrastructure development, informal uses, and is nature focused.*

"Only when we realize that we don't live forever, this perspective impresses on us how this land doesn't really belong to us, we belong to it."
— Harvey Nix, HNG Group Member

General Summary

Hickory Nut Gorge is characterized by its steep and complex topography, which significantly influences the prevalence of flooding and landslides, and necessitates careful consideration for rebuilding and new land development. The Gorge drops approximately 2,000 feet between Gerton and Lake Lure, formed over time by the Rocky Broad River and its swift moving tributaries as they carved through and eroded the landscape. Steep slopes are among the key contributing factors in landslide susceptibility in the region. In neighboring Buncombe County, engineering analysis is required for building sites on a 35 percent or greater slope or in an area designated as High Hazard or Moderate Hazard on the Buncombe County Slope Stability Index Map. Less than 1% of the land in Hickory Nut Gorge has a slope less than 36%°, and most of that area is within the floodplain making any type of development challenging.

Given the inherent instability of steep slopes and the history of devastating natural disasters, considering slope for development in Hickory Nut Gorge is imperative. Rebuilding efforts should focus on increasing resilience in new development, FEMA flood buyouts, and protecting critical infrastructure such as roads, bridges, and utilities against streambank erosion and landslides. This should also include decisions regarding rebuilding roadways on unstable slopes. The FEMA flood buyout program provides funding to help people move out of dangerous flood zones and replace their homes with public land. A public entity or land trust must maintain this property as open space in perpetuity, but in some cases the land can be used for passive recreation opportunities.

The Henderson County 2045 Comprehensive Plan calls for hazard-informed infrastructure and limits new development on steep or flood-prone corridors and several recommendations in this recovery plan build upon the comprehensive plan. Future storms, landslides, and wildfires will threaten lives, property, and the local economy and cut off people's ability to travel and communicate, unless smarter land use and infrastructure that is designed to withstand future natural disasters is implemented within Hickory Nut Gorge.

General Thoughts

The Potential Debris Flow Pathways & Potential Flood Area Map and the Wildfire Risk to Homes Map included in this recovery plan can be used to help landowners reduce the risk of building in hazardous areas or determine if mitigation measures are warranted. These maps can also be used to help with land use planning, land use policy, and land development. In addition, the following ideas are suggested:

- Use Fernleaf's AccelAdapt (*www.fernleaf.us/acceladapt/*) data platform to aid planning decisions and ordinance changes to provide for future resiliency.
- Align land use planning with transportation and hazard mitigation.
- Restrict development in high-risk areas, including within stream or river buffers which are discussed in the 2045 County Comprehensive Plan.
- Adopt resilient building codes and slope stabilization requirements.
- Encourage conservation subdivision design.
- Protect rural character through design guidelines and zoning updates.
- Develop, map, and communicate hazard overlays on targeted corridors of highest risk.
- Evaluate current steep slope and ridge top protection ordinances to explore opportunities to strengthen requirements for the benefit of public safety.
- Conduct a study to determine if there is land outside of a hazard area for commercial use and adjacent to road network.

Project Recommendations

Land Use

The Hickory Nut Gorge community expressed strong interest in limiting growth in hazard-prone areas, improving rebuilding standards, and preserving the area's rural character. Past development practices have contributed to infrastructure failures and environmental degradation.

Hazard Mapping

Location: Countywide (focus on Hickory Nut Gorge hazard zones)

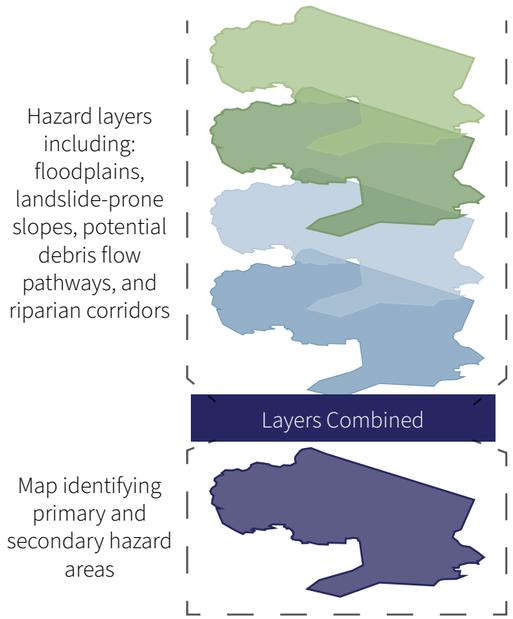
Potential Key Stakeholder: Henderson County Planning Department

Potential Partners: Land of Sky Regional Council, NCEM, Grassroot Organizations

General Cost: $$

Project Description: Map hazard areas that include floodplains, landslide-prone slopes, potential debris flow pathways, and riparian corridors to identify suitable areas for land development. Evaluate the opportunity to re-establish commercial use in suitable areas beyond hazard prone areas. The mapping should identify "primary" hazard areas and "secondary" hazard areas to inform potential land use restrictions and requirements for rebuilding or building new in these areas. This can include a "Suitability Assessment" for the Gorge to identify suitable buildable areas to help direct development to these areas. The mapping can help inform the county and the community if commercial zones should consider relocating outside the floodplain.

Project Benefit: The mapping can help inform the public, developers and planners to guide infrastructure investment and help prevent unsafe development.



Strategic Buyout Parcel Reuse Plan

Location: FEMA/NC Emergency Management buyout parcels

Potential Key Stakeholder: Henderson County and State Emergency Management

Potential Partners: FEMA, Conserving Carolina, Trust for Public Land (TPL), Community Foundation of Henderson County, Land of Sky Regional Council,

General Cost: $ - $$

Project Description: Develop a plan for buyouts and other acquisitions of the most hazardous areas along the floodplain so there's continuity in the land that will become open space and used to lessen the impact of future natural disasters. Repurpose buyout parcels for passive recreation, greenways, or conservation. Purchase repetitively damaged lots from flooding or landslide and convert them into open space, small parks, conservation areas, and/or riparian buffers; relocate residents to designated areas outside of hazard areas. Focus additional acquisition efforts with landowners not participating in FEMA buyouts in the areas along the Rocky Broad River/US 74A from the county line to the intersection of Hwy 9 in Bat Cave. For potential buyouts on properties in residential developments there may be HOAs or covenants and restrictions that should be considered. In such cases, homeowners should be included in the discussions about strategic buyouts.

Project Benefit: Preserves open space, provides flood mitigation and potential opportunities for floods storage, supports recreation, prevents redevelopment in locations where it is unsafe to rebuild.

Environment Connection

Hazard properties can be restored to a natural condition or designed to address concerns such as flooding.

Recreation Connection

Some properties may support passive recreation with limited infrastructure.

Resilient Building Code

Location: Countywide

Potential Key Stakeholder: Henderson County Building Services

Potential Partners: NC Emergency Management, American Planning Association NC Chapter, Land of Sky Regional Council

General Cost: $

Project Description: Henderson County should encourage and educate landowners and developers to utilize more environmentally sustainable/resilient materials (flood resilient materials), designs (firewise landscaping), and construction practices (elevating foundations) that go beyond state building code requirements.

Project Benefit: Reduces future damage, improves safety, reduces future loss of investment from rebuilding.

Infrastructure Connection

Resilient building techniques or materials can make infrastructure more resilient to future flooding or wildfires.

Section G: Housing

$ < 250K
$$ - 250-500K
$$$-500K-1M
$$$$-1M-3M
$$$$$ > 3M

PROJECT NAME	BRIEF DESCRIPTION OF PROJECT	PRIORITY (High, Medium, Low)	POTENTIAL KEY STAKEHOLDER	POTENTIAL PARTNERS	POTENTIAL COST
CULTURE OF PREPAREDNESS					
Community Resilience Campaign	Partner with Regional Hazard Mitigation Plan efforts and their preparedness messaging to activate public education informing households and businesses of their risks to flooding, landslides, and wildfires. The public awareness campaigns must include measurable outcomes to be effective.	Low	Henderson County Communications Department	Henderson County Planning Department, Henderson County Emergency Services, Land of Sky Regional Council, Community Foundation of Henderson County, FEMA	$
HAZARD MITIGATION HOUSING SUPPORT					
One-Stop-Shop Housing Recovery Navigator	Create a central hub to help homeowners understand their housing and utility repair options, access hazard data, access grants/loans, navigate permitting, and find safe areas to rebuild or relocate.	Low	Henderson County Planning and Community Development	NC Commerce DCR – Renew NC Single-Family Housing Program, local nonprofits, Mountain Housing Opportunities, FEMA	$$
Housing Resilience Program	Conduct parcel-level flood, wildfire, landslide risk assessments using the AccelAdapt data platform and implement best management practices to mitigate risk.	Low	Henderson County Emergency Services	NCEM, FEMA, HMGP	$$-$$$$
AFFORDABLY REBUILD AND RETAIN LOCALS					
Resilient & Affordable Workforce Housing Pilot (Edneyville)	Incentivize affordable and hazard-informed housing development near safer road corridors to support workforce retention and displacement prevention. Establish a down payment/rent assistance program for low-and moderate-income households affected by Helene.	Low	Housing Assistance Corporation	Dogwood Health Trust & Habitat for Humanity	$$$
Explore Housing Rebuilding & Relocation Grant Funds	Pursue or assemble grant opportunities for Hickory Nut Gorge residents to help rebuild safely or relocate without losing community ties.	Low	Henderson County	Community Foundation Henderson County, Dogwood Health Trust, Habitat for Humanity, Mountain Housing Opportunities	$$$

General Summary

Housing was heavily impacted during the disaster. Based on the Henderson County Damaged Structures Assessment, of the 1,086 total building structures in the Hickory Nut Gorge, 281 were damaged and 112 were destroyed. Many full-time residents and second-home owners lost safe access due to road washouts and private bridge failure, and some homes were destroyed or left unsafe after landslides and flooding wreaked havoc in the Gerton and Bat Cave communities. Recovery is hindered by insurance issues or a lack of insurance all together, high rebuilding costs, and a market already pressured by second homes and short-term rentals. If rebuilding happens unsafely then overall risk will increase, or if only for high-end homes, then long-time residents could be displaced. There is often a need to preserve affordable housing stock as part of recovery efforts. A housing buy-down program is a tool to preserve affordability often used after disasters or in rapidly appreciating markets to prevent displacement and maintain long-term access to housing for residents. It uses public or philanthropic funds to "buy down" part of the cost of a home or mortgage, effectively reducing the sale or rent price to an affordable level for qualified households.

General Thoughts

- Build a culture of preparedness - establish a sustained public education and engagement program to help households and neighborhoods understand their flood, landslide, and wildfire risks; create and practice emergency plans; and know how to access aid after disasters. Use annual campaigns, community workshops, school programs, and partnerships with civic groups and volunteer fire departments to embed preparedness as a shared community value and reduce vulnerability when future hazards occur.
- Provide technical help and incentives for hazard-informed rebuilding to elevate, retrofit, or relocate homes outside high-risk flood and landslide zones.
- Protect housing affordability by developing a housing trust or buy-down program so disaster recovery does not accelerate displacement.
- Develop a clear homeowner support system to create a one-stop-shop recovery navigator for grants, insurance, and permitting.
- Actively ensure data on hazards is publicly available. Work with realtors so they understand the data and can disclose hazard risks.
- Consider participation in the NFIP Community Rating System (FEMA) to support homeowners in reducing their flood insurance premiums.

Project Recommendations

Culture of Preparedness

Community Resilience Campaign

Potential Key Stakeholder: Henderson County Communications

Recommended Key Partners: Henderson County Planning Department, Henderson County Emergency Services, Land of Sky Regional Council, Community Foundation of Henderson County, FEMA

General Cost: $

Project Description: Utilize the Regional Hazard Mitigation Plan (South Mountains 2025 Regional Hazard Mitigation Plan) efforts and the public education and awareness messaging in the plan to activate public education informing residents, elected officials, business owners, and visitors to the risks of flooding, landslides, and wildfires. Examples of measures to educate and inform the public identified in the Regional Hazard Mitigation Plan include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children educational programs
- Hazard exposition

Community outreach efforts could consider the use of NC Youth Conservation Corps (NCYCC) programs to enhance and maintain youth knowledge about Hickory Nut Gorge and engagement in the restoration and long-term maintenance.

Project Benefit: Sustained public education and engagement to help households and neighborhoods understand risks.

Example resources to build from:

- Community Wildfire Defense Grant dashboard: designed to help communities determine if they are eligible for the grant program and pulls the data communities need to fill the application.
- Wildfire Risk to Communities has wildfire risk for all communities in the US. This was developed in partnership with USFS (it uses their data).
- Neighborhoods at Risk overlays socioeconomic data at the tract level with climate-related risks from flooding, heat, and wildfire.
- Landslides | NC DEQ Provides resources to inform communities of landslide hazards in Western North Carolina

Emergency Preparedness Connection

Building awareness in the community can help people prepare and respond to future events.

Hazard Mitigation Housing Support

One - Stop - Shop Housing Recovery Navigator (Hickory Nut Gorge-Wide)

Potential Key Stakeholder: Henderson County

Recommended Key Partners: NC Commerce DCR – Renew NC Single-Family Housing Program, local nonprofits, Mountain Housing Opportunities, FEMA

General Cost: $$

Project Description: Central hub to help homeowners understand their housing and utility repair options, access hazard data, access grants/loans, navigate permitting, and find safe areas to rebuild or relocate. This can also be used to provide specialists in site engineering, housing construction, utility connections (septic, electric, broadband), driveway/bridge design, hazard mitigation etc. Once recovery is underway it can also serve as a dashboard for the community to see the recovery work that is underway.

Project Benefit: Provides guidance, permitting help, and cost share for elevation/retrofit, and as a general communication tool during recovery

Housing Resilience Program

Potential Key Stakeholder: Henderson County Emergency Services

Recommended Key Partners: NC Emergency Management and FEMA Hazard Mitigation Grant Program

General Cost: $$-$$$$

Project Description: Conduct parcel-level flood, wildfire, landslide risk assessments using the AccelAdapt data platform and implement best management practices to mitigate risk.

Planning, design, engineering assistance and cost-share grants to retrofit homes sites, driveways, and private access roads and bridges to mitigate hazard risks from floods, landslides, and wildfire.

Project Benefit: Enables professional services to be accessible to residents seeking to install resilience retrofits

Affordably Rebuild and Retain Locals

Resilient & Affordable Workforce Housing Pilot (Edneyville)

Potential Key Stakeholder: Housing Assistance Corporation

Recommended Key Partners: Dogwood Health Trust and Habitat for Humanity

General Cost: $$$

Project Description: Incentivize affordable and hazard-informed housing development near safer road corridors to support workforce retention and displacement prevention. Establish a down payment/rent assistance program for low-and moderate-income households affected by Helene.

Project Benefit: Preserve housing stock for residents via incentives or trust fund and avoid rebuilding in high-risk areas and encourage conservation subdivisions and clustered development.

Housing Rebuilding & Relocation Grant Funds

Potential Key Stakeholder: Henderson County

Recommended Key Partners: Community Foundation Henderson County, Dogwood Health Trust, Habitat for Humanity, Mountain Housing Opportunities

General Cost: $$$

Project Description: Pursue or assemble grant opportunities for Hickory Nut Gorge residents to help rebuild safely or relocate without losing community ties. This could include a housing buy-down program that could be funded by local housing trust funds, CDBG-DR, philanthropic recovery funds (like Dogwood Health Trust), or state-level resilience and housing programs. Henderson County or a local nonprofit housing partner (e.g., Mountain Housing Opportunities, Habitat for Humanity, or a future HNG Housing Trust) could administer such a program to stabilize post-disaster housing and ensure affordability over time.

Project Benefit: Supports disaster recovery by ensuring that residents can rebuild or relocate without displacement in safer areas, maintaining the social fabric of the Hickory Nut Gorge.

Section H: Tourism & Economy

$ < 250K
$$ - 250-500K
$$$-500K-1M
$$$$-1M-3M
$$$$$ > 3M

PROJECT NAME	BRIEF DESCRIPTION OF PROJECT	PRIORITY (High, Medium, Low)	POTENTIAL KEY STAKEHOLDER	POTENTIAL PARTNERS	POTENTIAL COST
COMMERCIAL CORRIDOR RESILIENCE					
Commercial Corridor Revitalization	Repair and enhance county infrastructure network for businesses – utilities, sewer/septic, telecommunications – apply for the NC Commerce Small Business Infrastructure Grant Program Retrofit core commercial buildings with elevated utilities, flood-proofing grants/ loans, and shared flood-safe parking and storage.	Low	Henderson County	Henderson County Chamber of Commerce, Community Foundation of Henderson County, NC Commerce: Main Street, Rural Planning, Outdoor Economy, Division of Community Revitalization (DCR)	$$$
BUSINESS RECOVERY SUPPORT AND INCUBATION					
Small Business Recovery and Resilience Hub (Gerton/Bat Cave)	Create a location where community can access grants, technical aid, and shared dry storage or temporary retail. The services provided here can be integrated into a community center along with shared co-working, resilience training, and emergency power and broadband in case of future risks.	Low	Henderson County	Community Foundation of Henderson County (Love Hendo Fund), Mountain BizWorks, NC Commerce, SBA	$$-$$$
Pop-Up Outdoor Marketplace	Provide accessible space for local entrepreneurs to continue operations safely during rebuilding, supporting short-term economic recovery, and sustaining visitor activity in key commercial nodes.	Low	Henderson County Chamber of Commerce	Henderson County, Community Foundation of Henderson County (Love Hendo Fund), Local merchants, NC Main Street, Mountain BizWorks	$$
VISITOR INFRASTRUCTURE AND SAFE ACCESS					
Signage Package	Create a signage system to direct visitors to designated gateway points to the Gorge and to allow safe pull-offs with visitor information kiosks to reduce traffic delays for local residents.	Low	Henderson County Tourism Development Authority	NCDOT, Planning & Recreation Departments, Conserving Carolina	$$

"Mudtools is more than a business—it's a community. Our team of 23 employees is part of that, and we're determined to rebuild so we can get back to making the tools we love and supporting the clay community."
— Michael Sherrill, HNG Group Member

General Summary

Tourism is the economic driver of the Hickory Nut Gorge communities. Residents and visitors have been attracted to the Gorge for generations due to the pristine natural beauty of the Southern Appalachian mountain landscape. People flock to the Gorge for outdoor recreation adventures such as scenic drives, picnics, hiking, biking, kayaking, fishing, climbing, wildlife viewing, along with agritourism and often will patronize local businesses, which stimulates the local economy. Tropical Storm Helene flooded and damaged many small businesses - especially along Hickory Creek in Gerton and the Rocky Broad River in Bat Cave - destroying merchandise, equipment, and supporting infrastructure. Without targeted support, these locally owned businesses risk permanent closure. The County can help them rebuild in safer ways: hardening utilities, elevating critical systems, creating shared dry storage, improving visitor access and safety, and implementing safer land use planning and design for commercial zones.

General Thoughts

- Ensure adherence to flood standards for new development projects. Lobby for transfer of development rights (TDR) which is currently not allowed in NC except for limited scenarios.
- Support clustered development outside of hazard areas.
- Rebuild Gerton and Bat Cave commercial corridors by incentivizing flood-resilient retrofits (elevated utilities, dry floodproofing, secure storage outside flood areas).
- Create shared business recovery and resilience resources: storage, emergency power, and incubator space above flood elevations.
- Market a resilient destination brand: promote stewardship and safety as part of the visitor experience.

Project Recommendations

Commercial Corridor Resilience

Commercial Corridor Revitalization (3 Commercial Zones - Gerton & Bat Cave)

Potential Key Stakeholder: Henderson County

Recommended Key Partners: Henderson County Chamber of Commerce, Community Foundation of Henderson County, NC Commerce: Main Street, Rural Planning, Outdoor Economy, Division of Community Revitalization (DCR)

General Cost: $$$, Upcoming Funding NC Commerce - DCR Renew NC: Economic Revitalization and Infrastructure Programs

Project Description: Repair and enhance county infrastructure network for businesses – utilities, sewer/septic, telecommunications – apply for the NC Commerce Small Business Infrastructure Grant Program

Support the retrofit of core commercial buildings with elevated utilities, floodproofing grants/loans, and shared flood-safe parking and storage

Project Benefit: Provides opportunities for a commercial core that is less susceptible to future floods, fire or landslides.

Business Recovery Support and Incubation

Small Business Recovery and Resilience Hub (Gerton/Bat Cave)

Potential Key Stakeholder: Henderson County

Recommended Key Partners: Henderson County Chamber of Commerce, Community Foundation of Henderson County (Love Hendo Fund), Mountain BizWorks, NC Commerce, Small Business Administration (SBA)

General Cost: $$-$$$

Project Description: Create a location where community can access grants, technical aid, and shared dry storage or temporary retail. The services provided here can be integrated into a community center along with shared co-working, resilience training, and emergency power and broadband in case of future risks. Grants, technical aid, and shared dry storage or temporary retail can speed up reopening after a natural disaster and reduce risk to businesses.

Project Benefit: Helps stabilize and retain local businesses critical to the Gorge's economy by providing financial relief and the technical tools needed to recover and adapt after disasters.

Community Connection

Can help support the business community and the greater community during a time of need.

Pop-Up Outdoor Marketplace (Commercial Zones - Gerton & Bat Cave)

Potential Key Stakeholder: Chamber of Commerce

Recommended Key Partners: Henderson County, Community Foundation of Henderson County (Love Hendo Fund), Local merchants, NC Main Street, Mountain BizWorks

General Cost: $$

Project Description: Seasonal, movable vendor stalls above base flood elevation for displaced or recovering businesses

Project Benefit: Provides accessible space for local entrepreneurs to continue operations safely during rebuilding, supports short-term economic recovery, and sustains visitor activity in key commercial nodes. By congregating multiple businesses in one location, the marketplace increases visibility, encourages collaboration, and makes it easier for residents and visitors to discover and support local businesses.

Visitor Infrastructure and Safe Access

Signage Package (County entry points and throughout corridor)

Potential Key Stakeholder: Henderson County Tourism Development Authority

Recommended Key Partners: NCDOT, Planning & Recreation Departments, Conserving Carolina

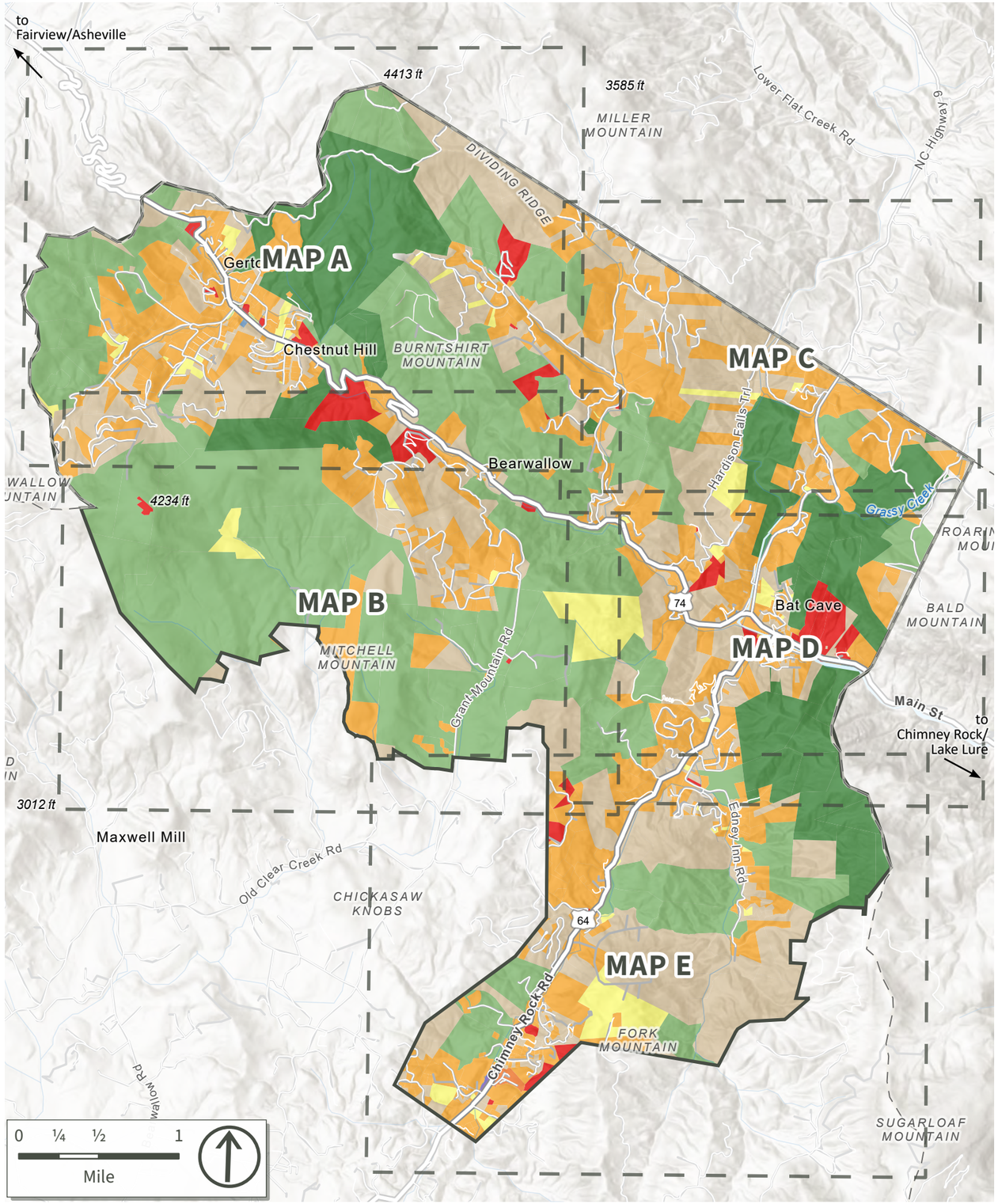
General Cost: $$

Project Description: Create a signage system to direct visitors to designated gateway points into the Gorge and create spaces adjacent to main thoroughfares to allow safe pull-offs with visitor information kiosks to reduce traffic delays for residents.

Project Benefit: Cultivates a Hickory Nut Gorge brand identity by creating a uniform experience for locals and visitors to navigate through Gorge communities while enhancing public safety and promoting cultural and ecological heritage.

Appendix A

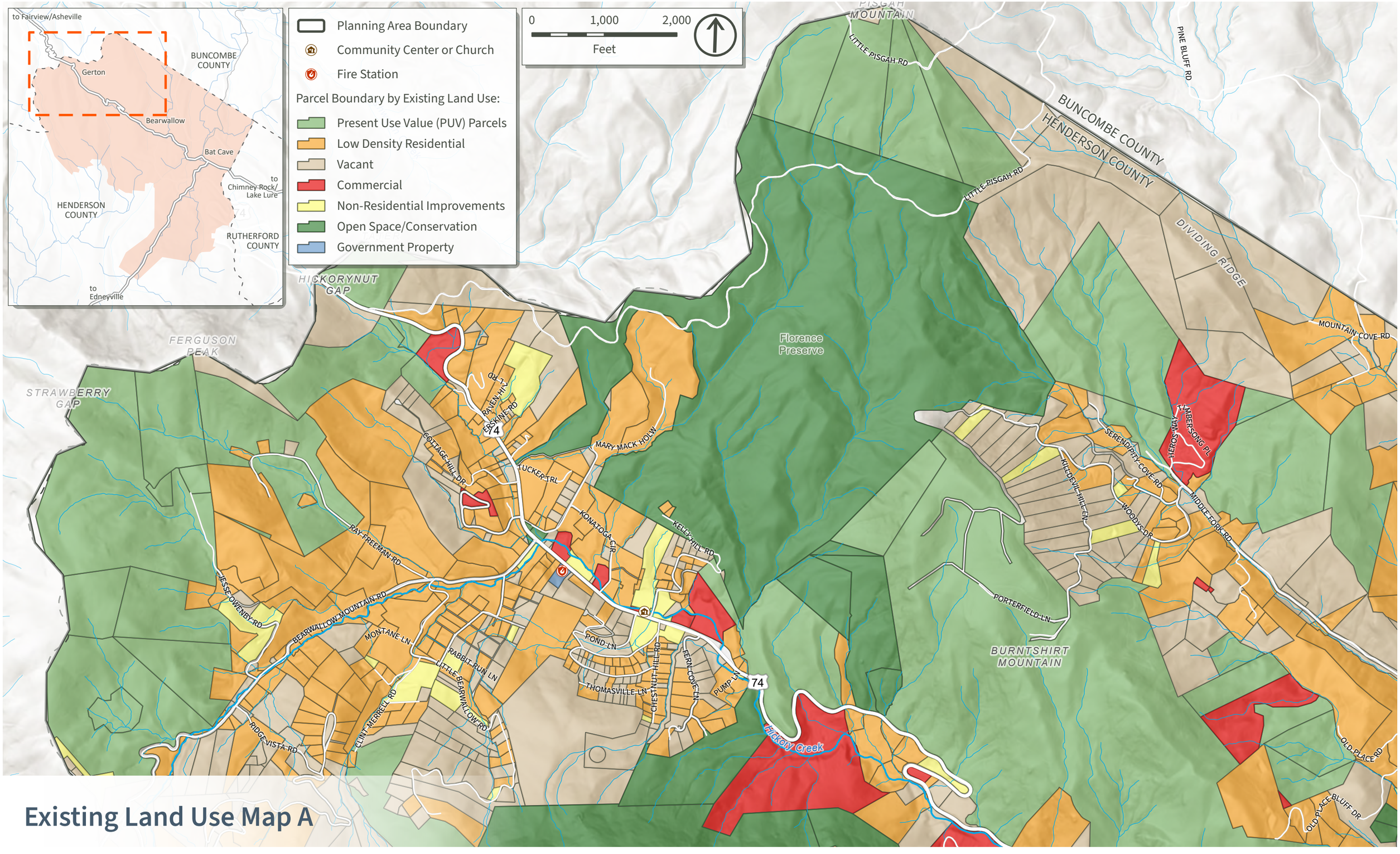
Land Use Maps



Planning Area Boundary

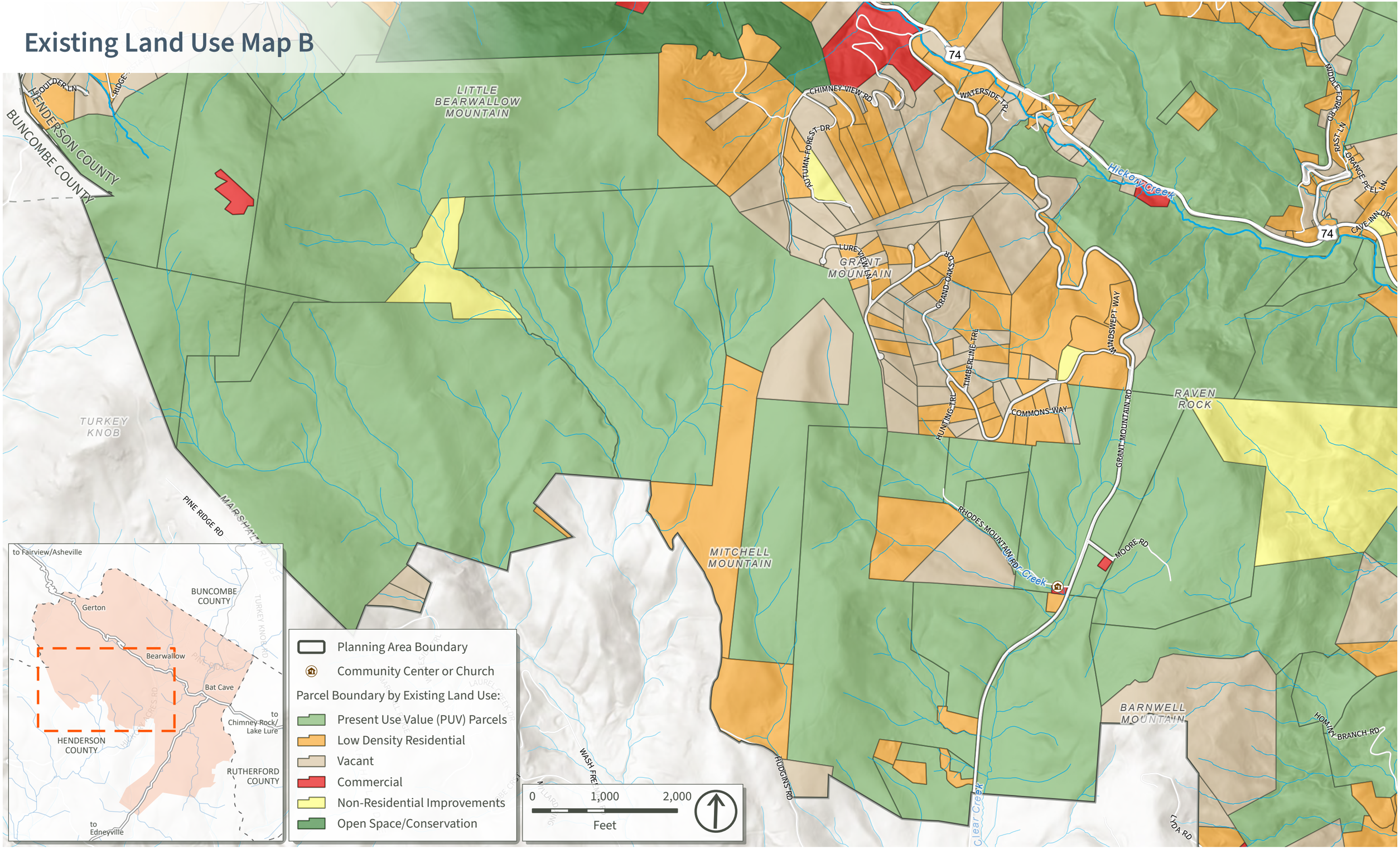
Parcel Boundary by Existing Land Use:

- Present Use Value (PUV) Parcels
- Low Density Residential
- Vacant
- Commercial
- Non-Residential Improvements
- Open Space/Conservation
- Industrial
- Medium to High Density Residential
- Government Property



Existing Land Use Map A

Existing Land Use Map B



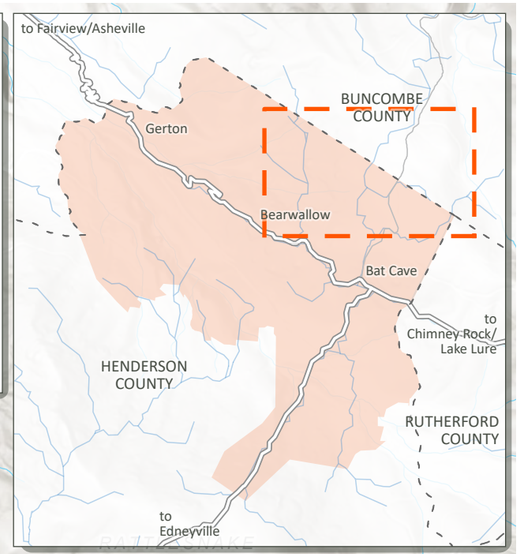
Existing Land Use Map C

0 1,000 2,000
Feet

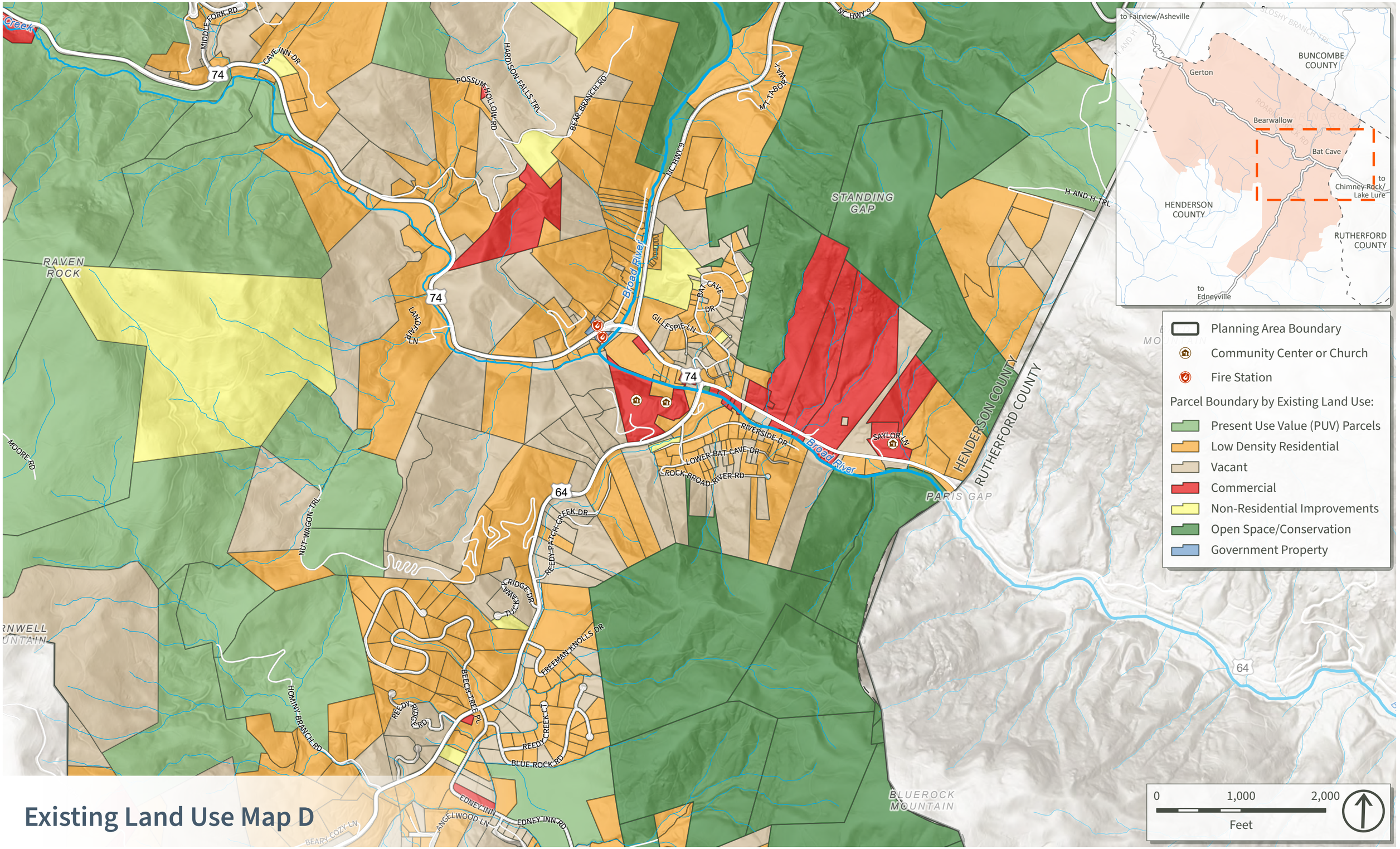
- Planning Area Boundary
- Community Center or Church

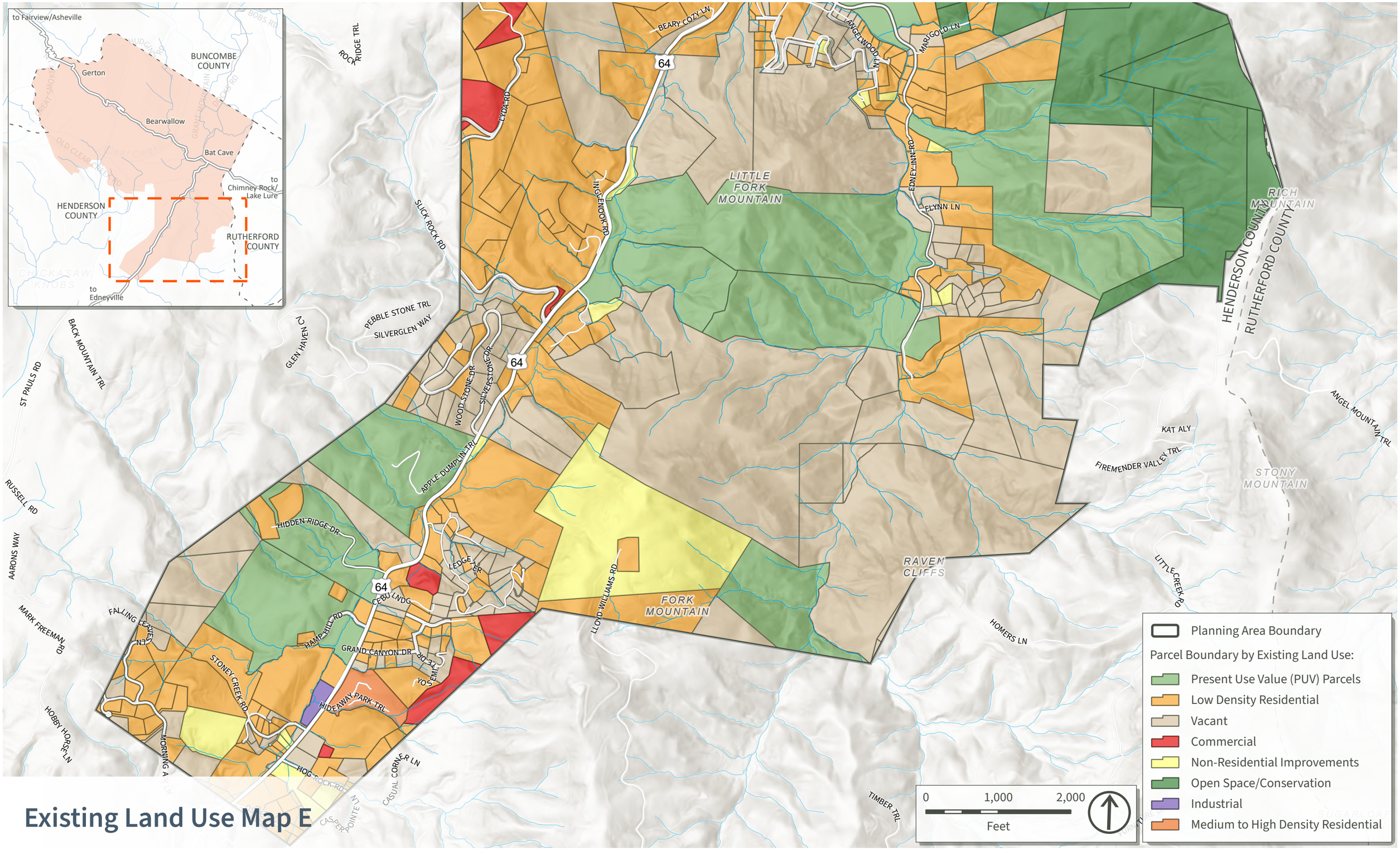
Parcel Boundary by Existing Land Use:

- Present Use Value (PUV) Parcels
- Low Density Residential
- Vacant
- Commercial
- Non-Residential Improvements
- Open Space/Conservation



Existing Land Use Map D

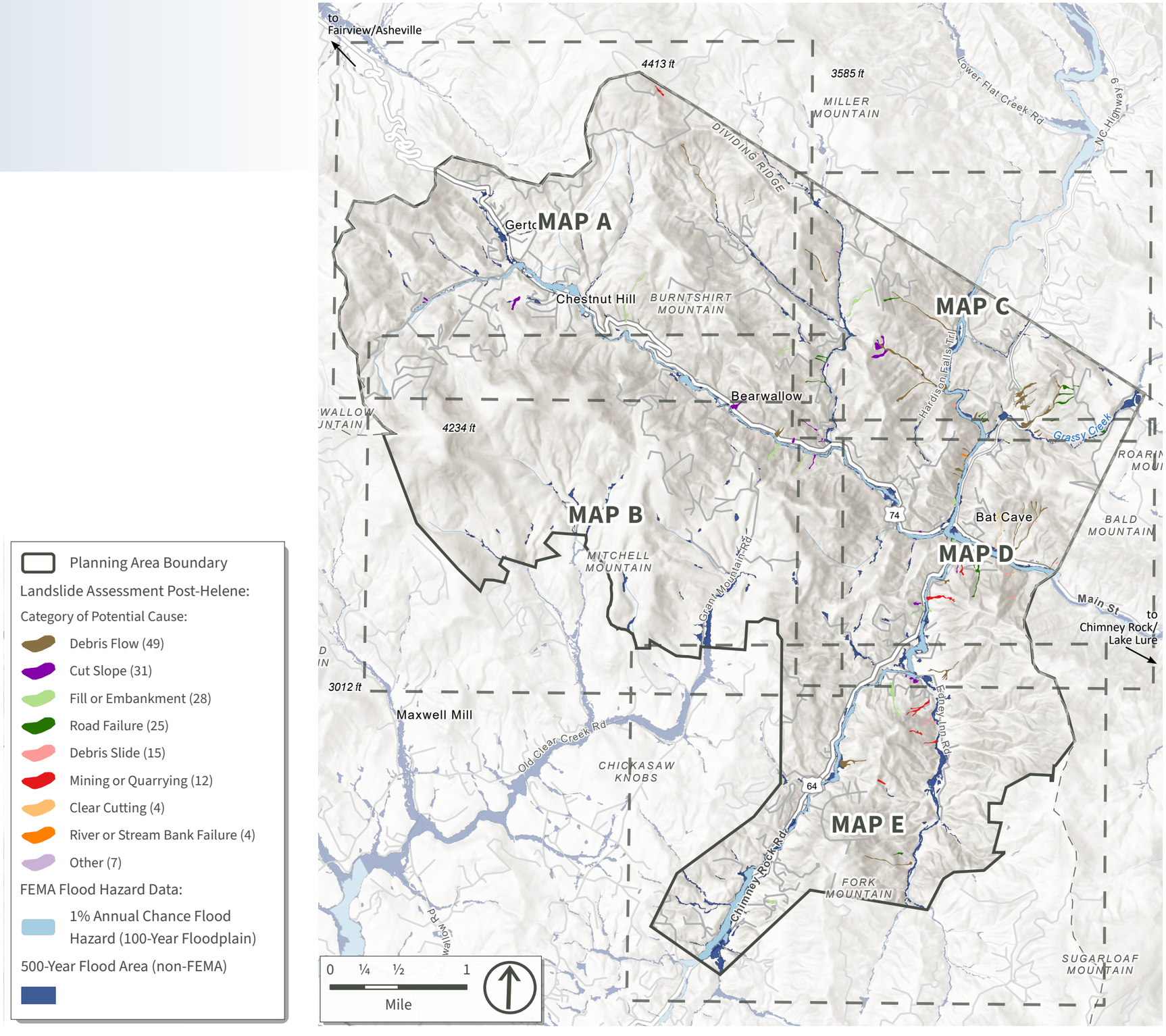




Existing Land Use Map E

Appendix B

Flood & Landslide Maps



- Planning Area Boundary

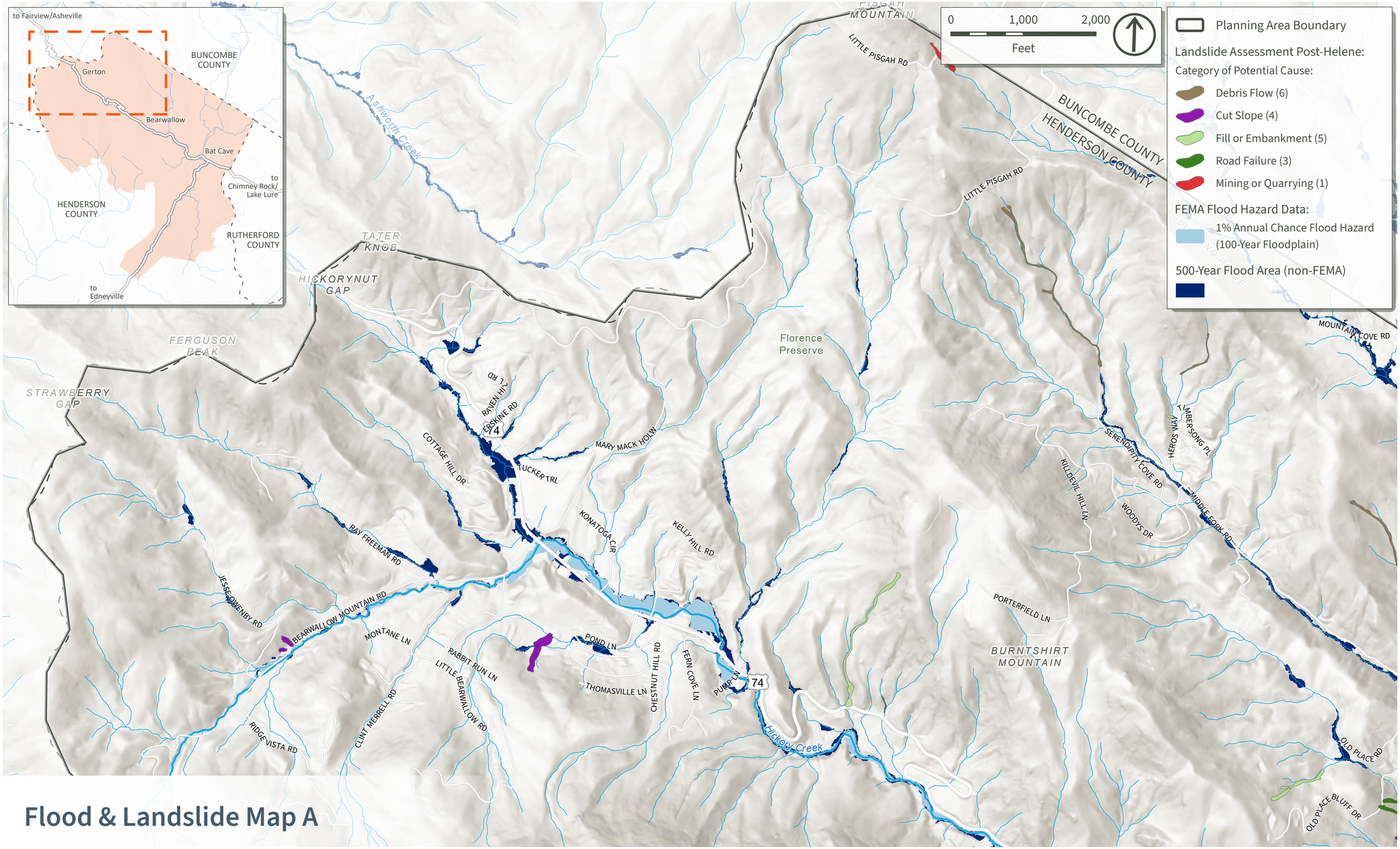
Landslide Assessment Post-Helene:

Category of Potential Cause:

- Debris Flow (49)
- Cut Slope (31)
- Fill or Embankment (28)
- Road Failure (25)
- Debris Slide (15)
- Mining or Quarrying (12)
- Clear Cutting (4)
- River or Stream Bank Failure (4)
- Other (7)

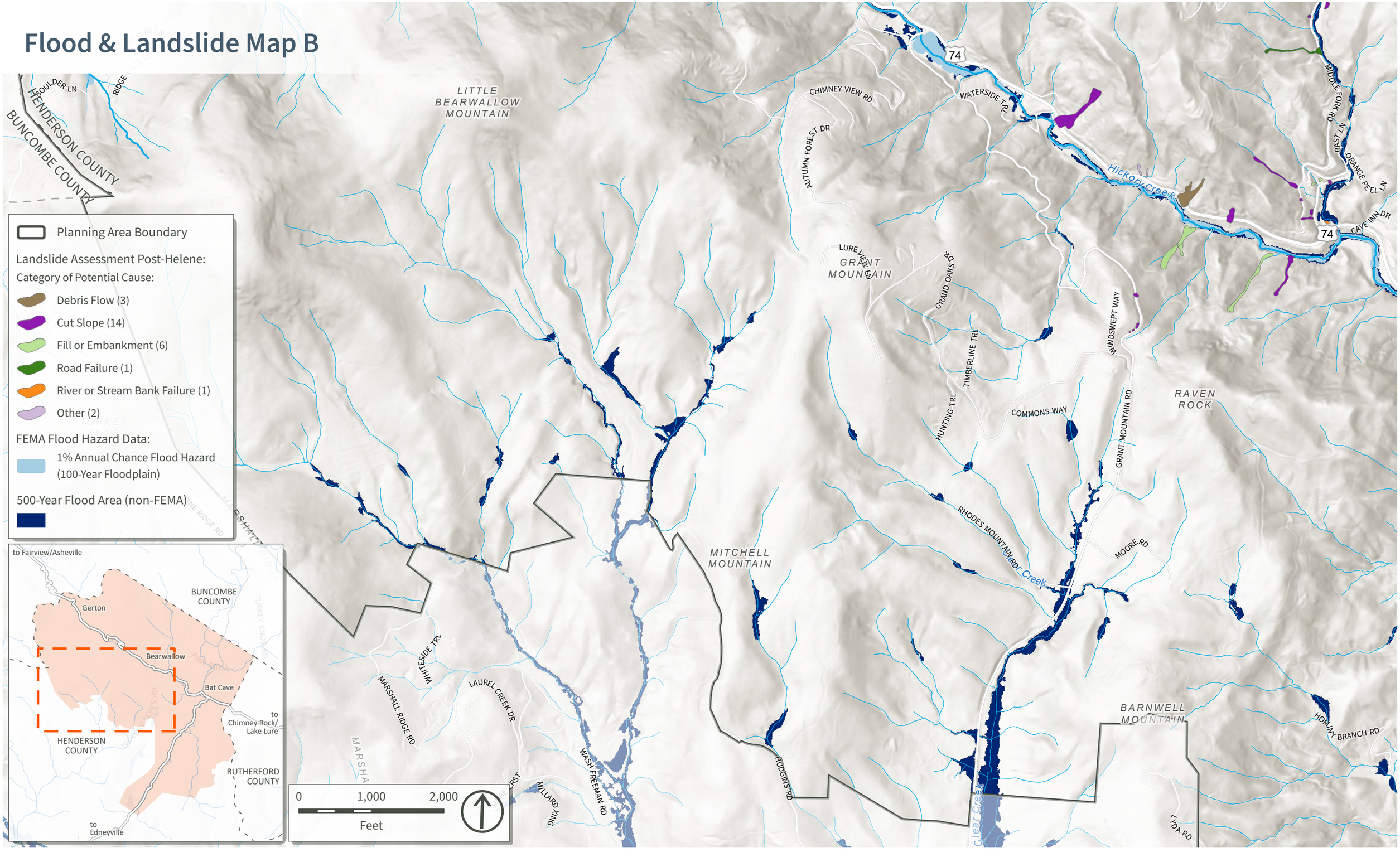
FEMA Flood Hazard Data:

- 1% Annual Chance Flood Hazard (100-Year Floodplain)
- 500-Year Flood Area (non-FEMA)

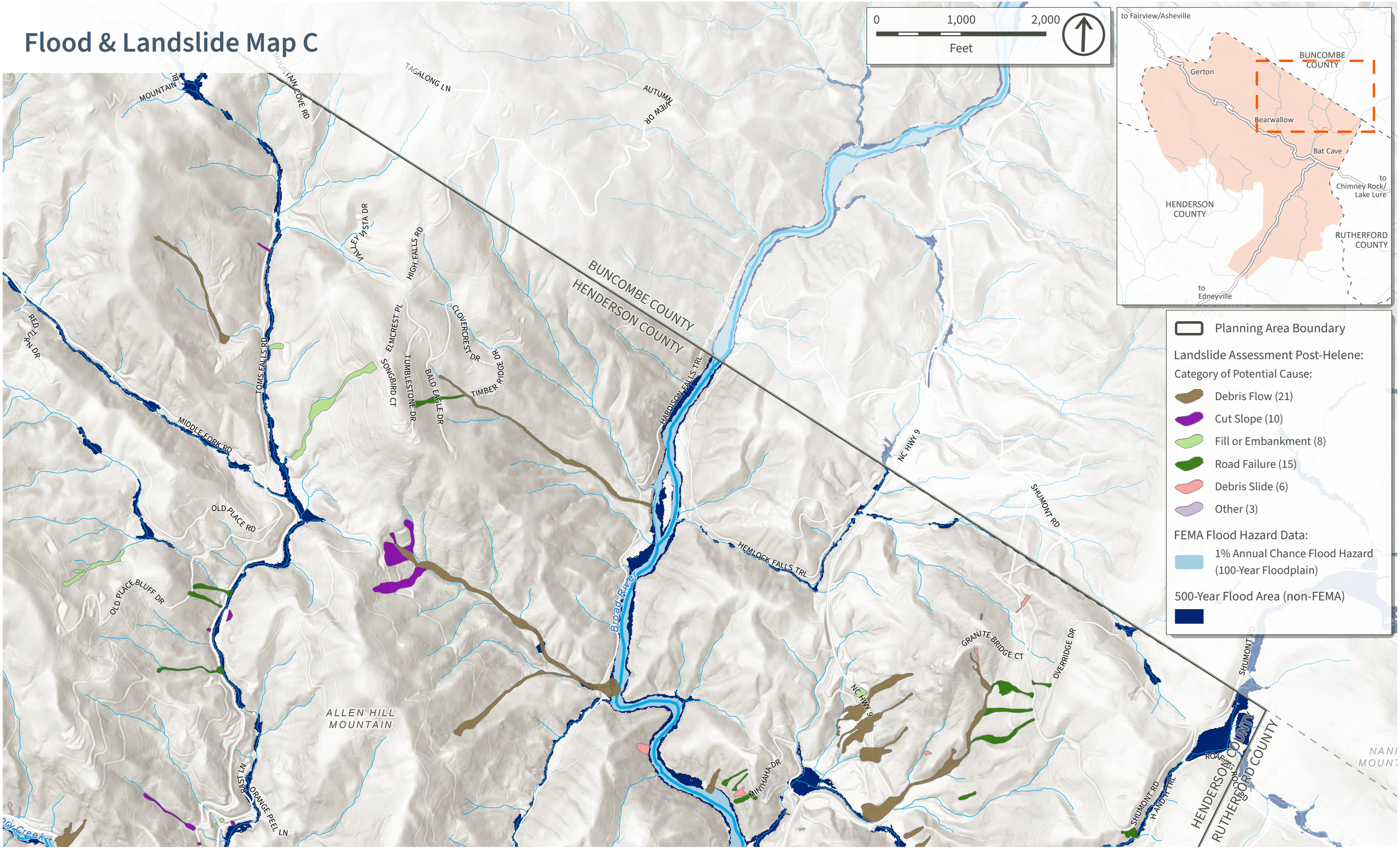


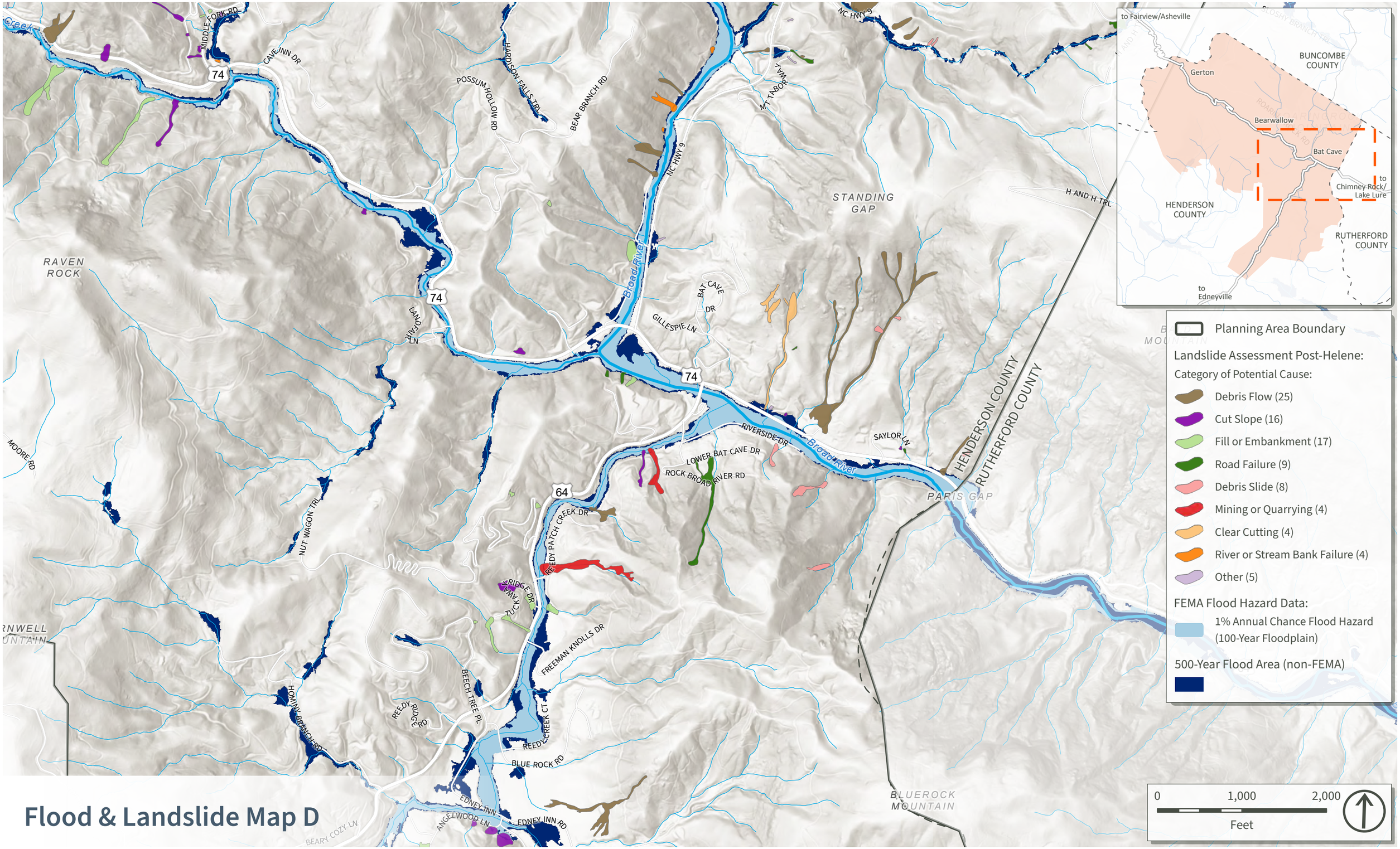
Flood & Landslide Map A

Flood & Landslide Map B

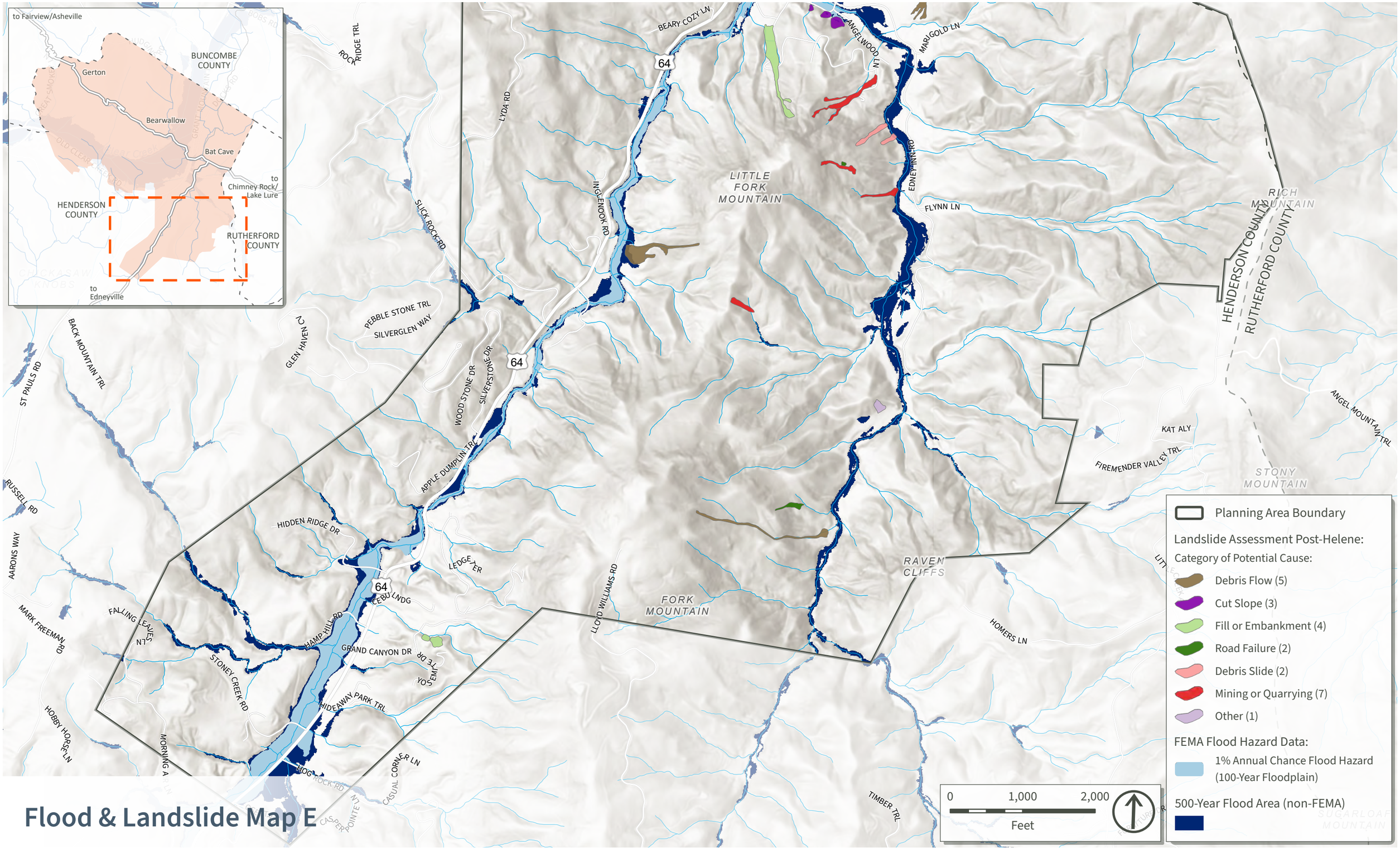


Flood & Landslide Map C





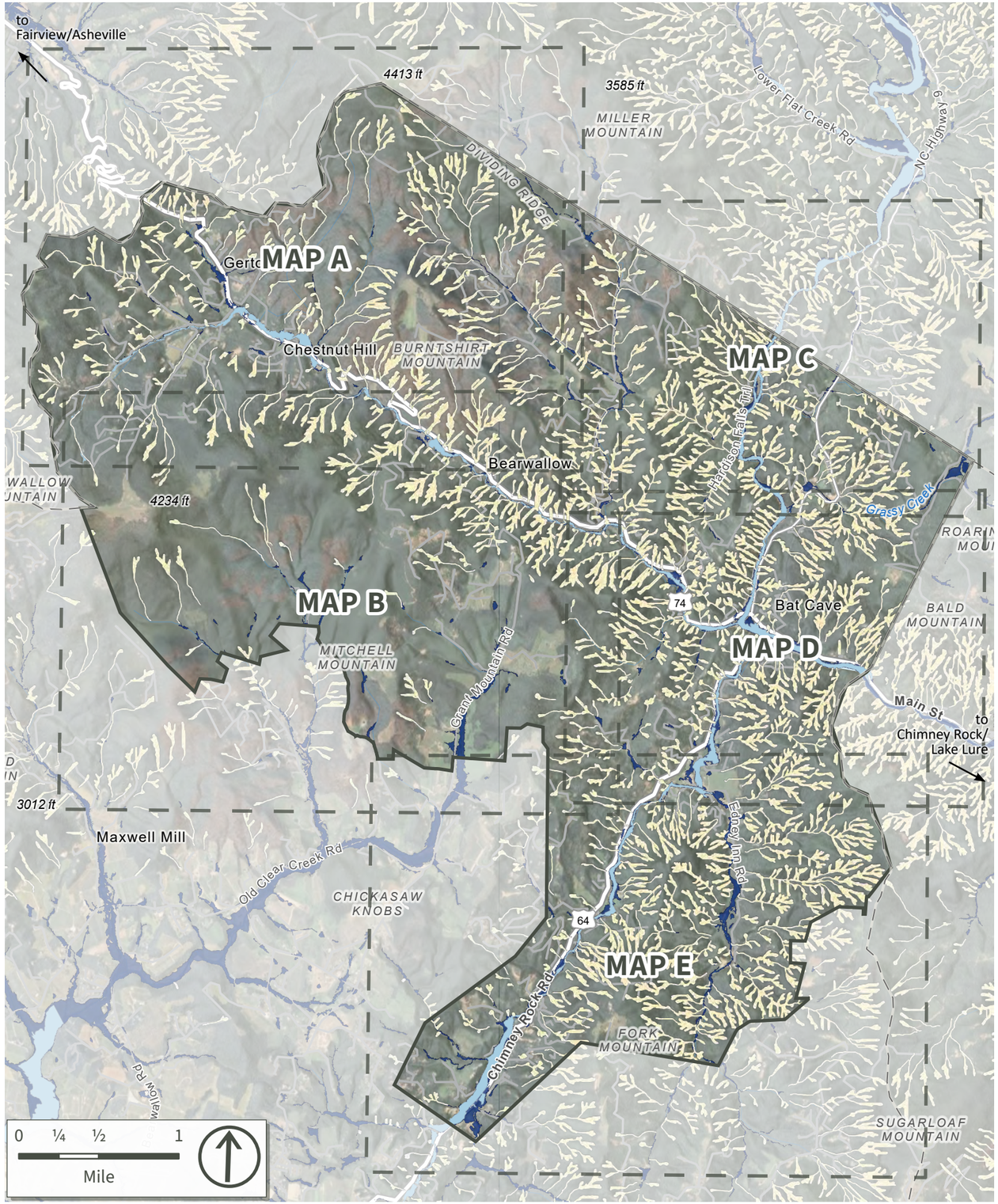
Flood & Landslide Map D



Flood & Landslide Map E

Appendix C

Potential Debris Flow Pathways & Potential Flood Areas Maps



Planning Area Boundary

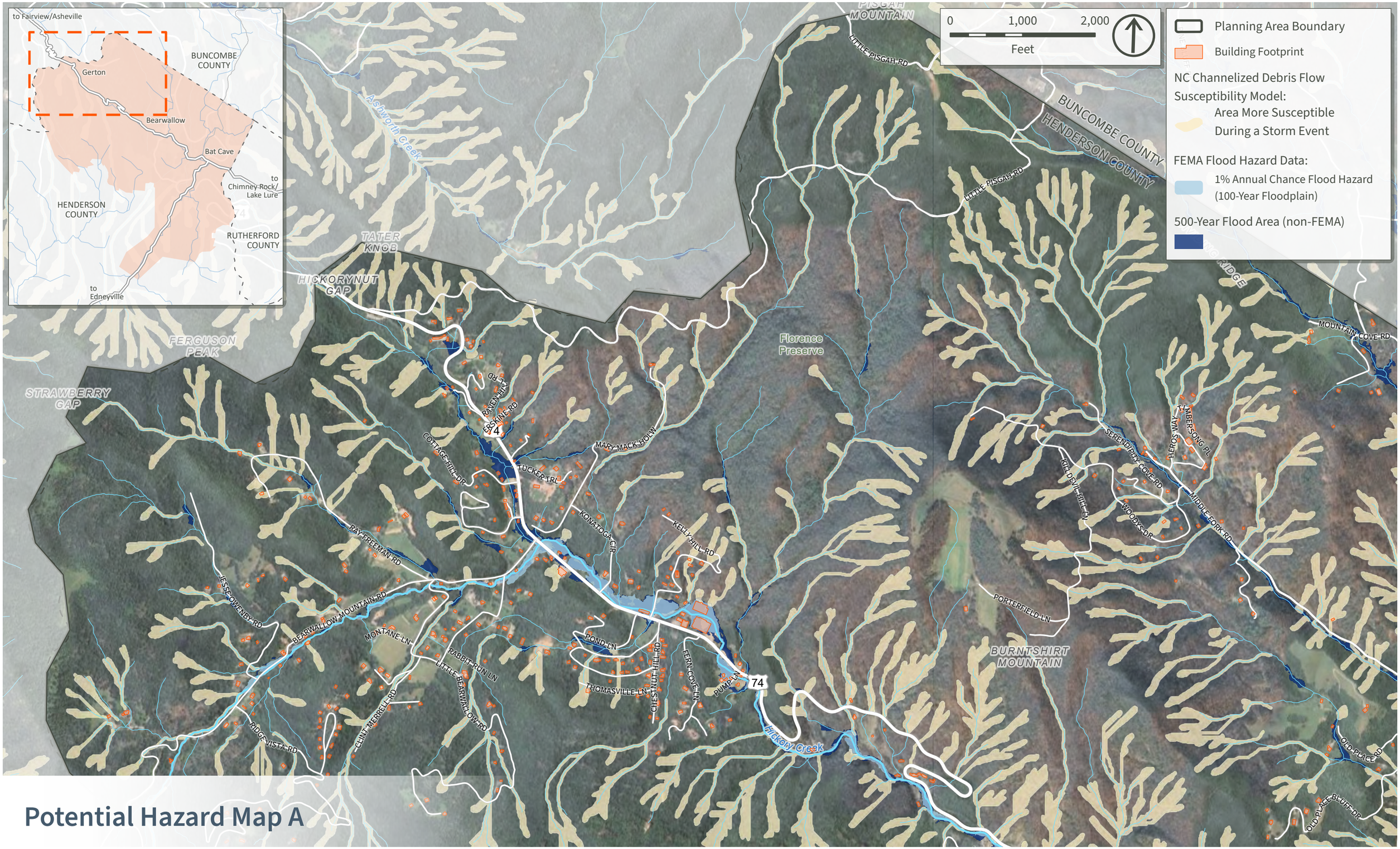
NC Channelized Debris Flow Susceptibility Model:

Area More Susceptible During a Storm Event

FEMA Flood Hazard Data:

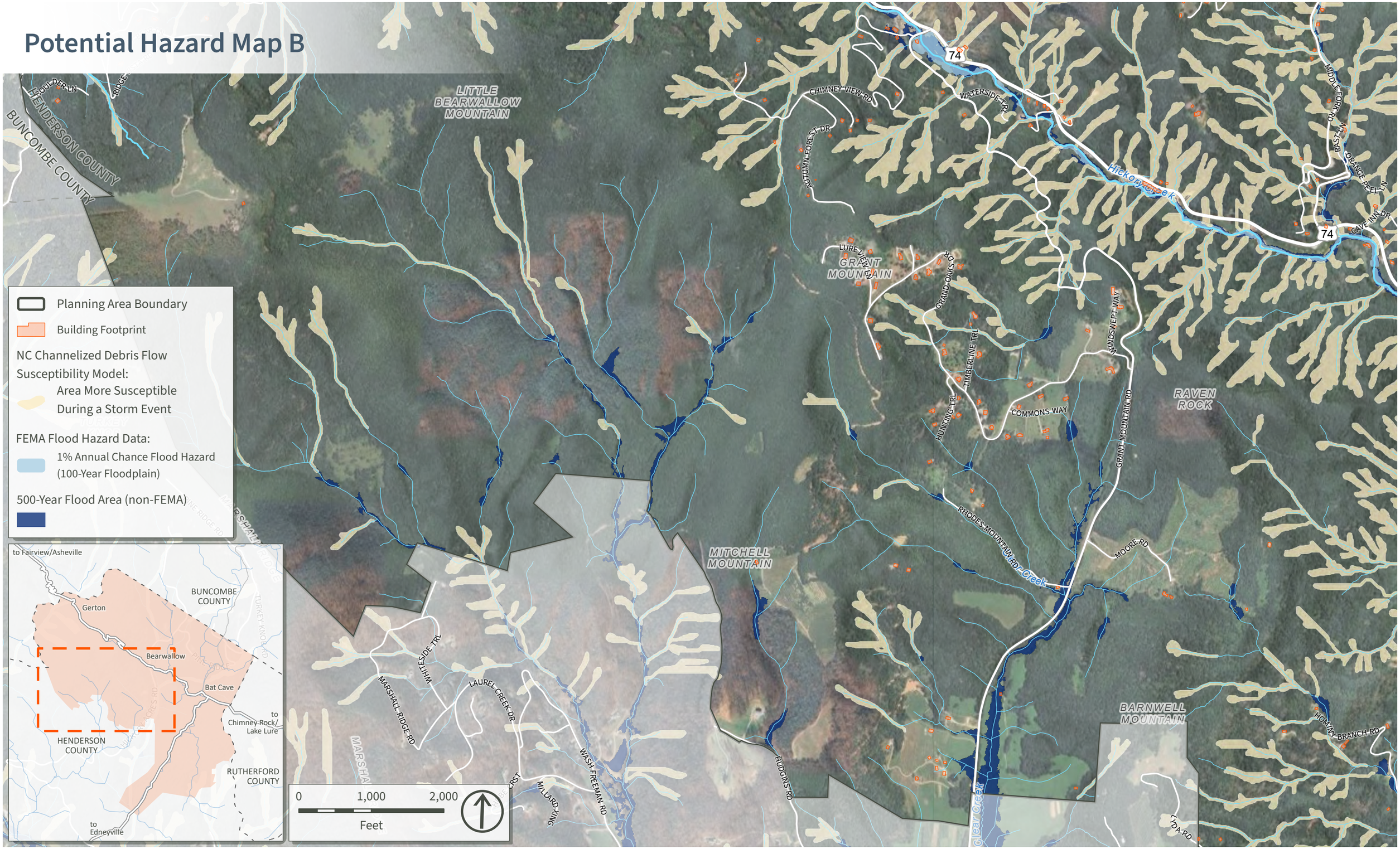
1% Annual Chance Flood Hazard (100-Year Floodplain)

500-Year Flood Area (non-FEMA):

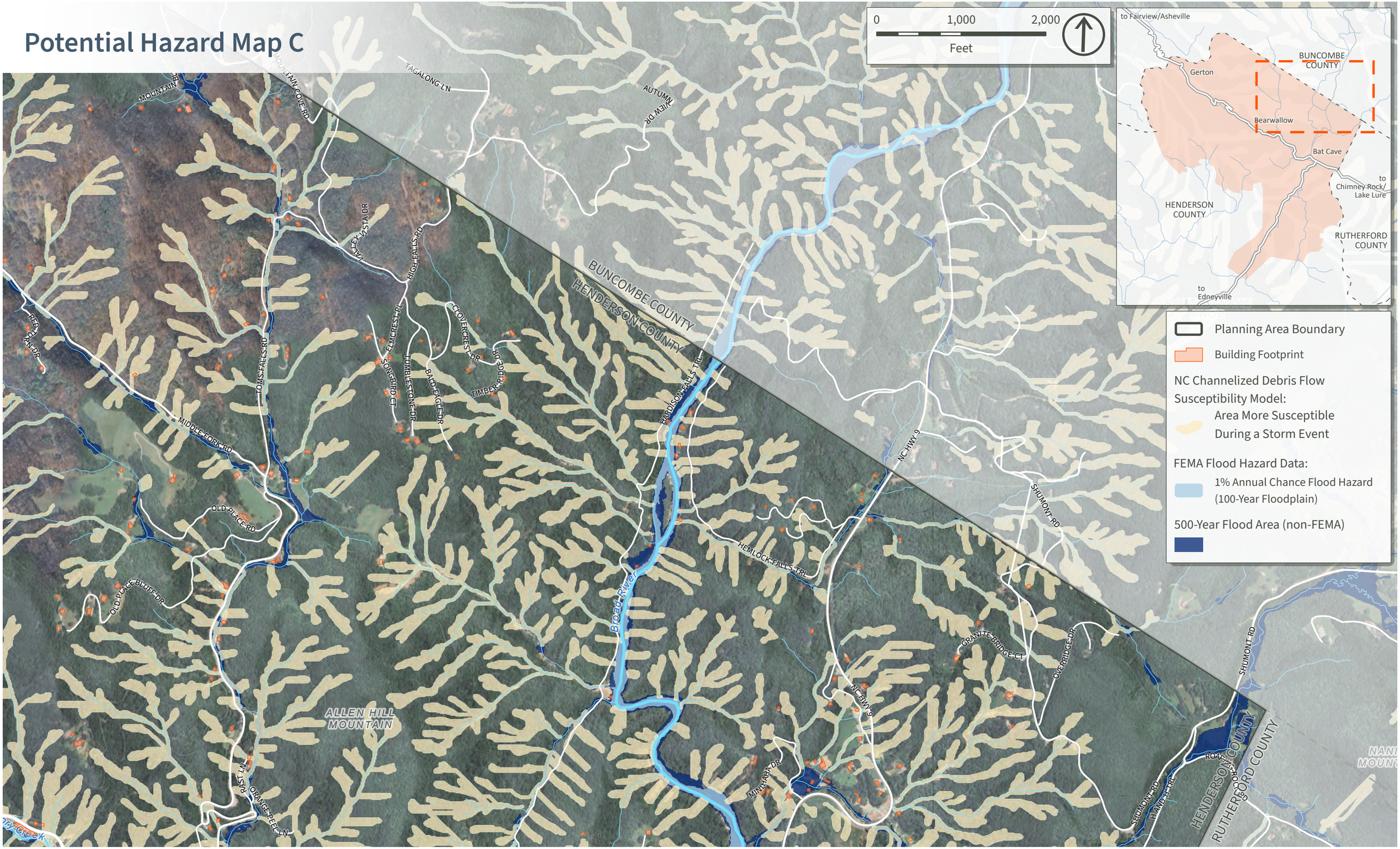


Potential Hazard Map A

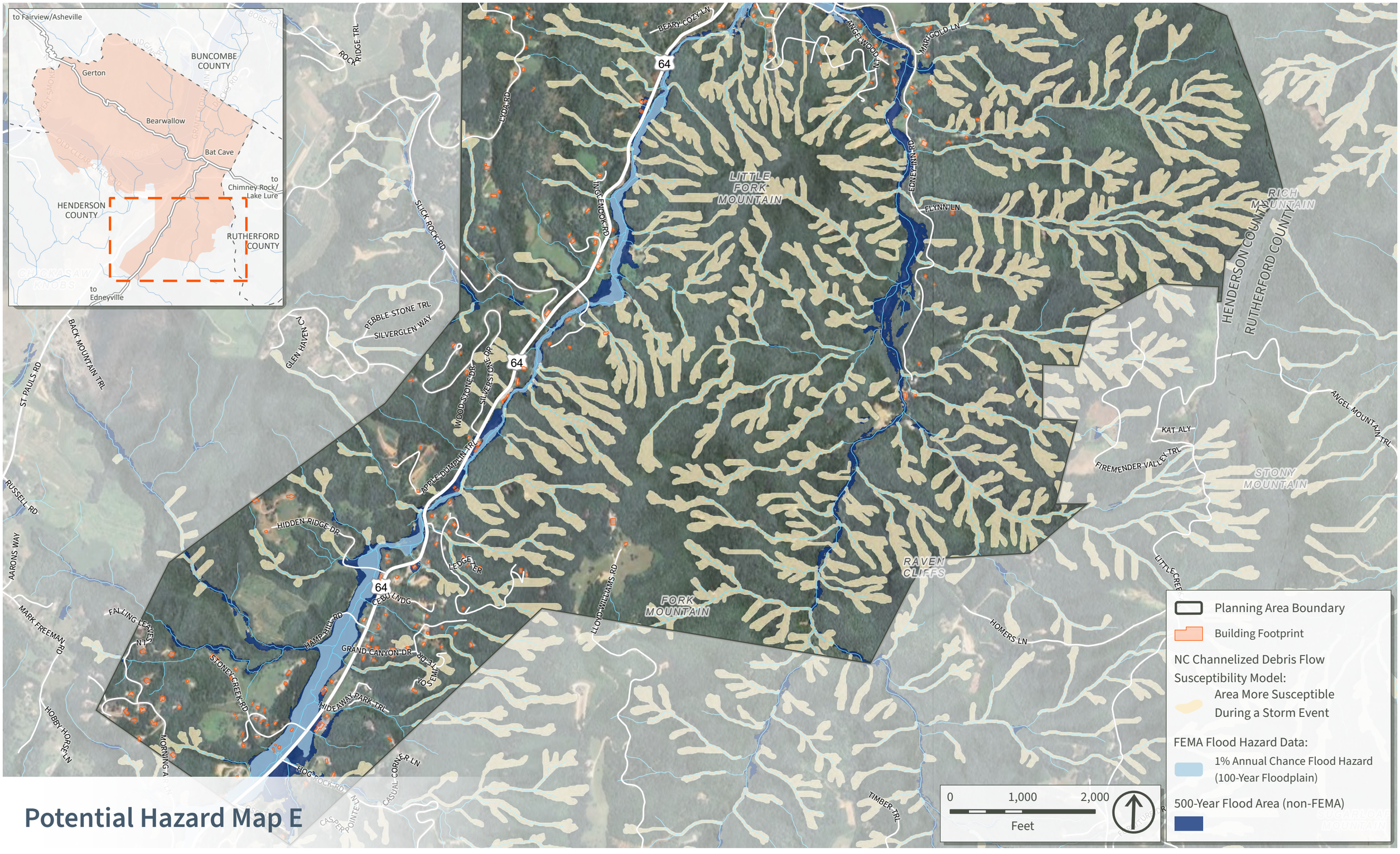
Potential Hazard Map B



Potential Hazard Map C



Potential Hazard Map D



Potential Hazard Map E

Appendix D: Full Case Study Summary

August 2025

Hickory Nut Gorge Post-Disaster Recovery Case Study

Lessons from the 2013 Colorado Floods

Planning for Long-Term Resilience in Western North Carolina

Prepared for
Henderson County, North Carolina

Prepared by
Equinox
Anchor QEA

Disclaimer and Release of Liability

This case study was prepared for Henderson County to share lessons from two Colorado communities affected by flooding in 2013, with the goal of supporting recovery planning for Hickory Nut Gorge after Tropical Storm Helene.

The information presented is for general educational and informational purposes only. It does not constitute legal, engineering, financial, or emergency management advice, and it should not be relied upon as a substitute for professional consultation in those areas. While effort has been made to provide accurate and relevant information, the authors make no representation or warranty, express or implied, regarding the completeness, reliability, or suitability of the content for any particular purpose.

Artificial Intelligence tools were used to assist in developing the outline and drafting language for this report. All content was reviewed and vetted by the project team; however, no guarantee can be made that the report is free from errors or omissions.

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TABLE OF CONTENTS

APPENDICES

Executive Summary

This case study explores long-term recovery efforts in Colorado following the devastating 2013 floods, with the goal of informing recovery planning in the Hickory Nut Gorge (HNG) region of Western North Carolina after Hurricane Helene. Focusing on the mountain towns of Lyons and Estes Park—communities with geographic, infrastructural, and socio-economic similarities to HNG—the case study provides practical, real-world insights into the complex transition from short-term emergency response to long-term, community-driven recovery.

Key findings emphasize that successful recovery is rooted not only in rebuilding infrastructure but in *reimagining it*. Colorado communities moved quickly to initiate long-term planning within a few months of the disaster, engaging residents through working groups and public forums, and aligning community needs with environmental, regulatory, and funding priorities. Over the following decade, they implemented projects that integrated transportation resilience, ecological restoration, and recreational access, demonstrating the power of multibenefit solutions.

Infrastructure repairs went beyond replacements, featuring redesigned roads, upsized culverts, and elevated utility systems. River corridors were re-engineered to support both flood mitigation and recreation, with parks and trails rebuilt to be more durable and accessible. Environmental restoration, initially overlooked, became a cornerstone of resilience planning through watershed-scale coordination and habitat-focused construction practices.

The case study also highlights critical cross-cutting challenges—including fragmented funding mechanisms, complex permitting environments, workforce shortages, and community fatigue—and offers tested strategies for overcoming them. These include the use of Unified Federal Review processes, mutual-aid agreements, recovery navigators, and early investment in civic participation and communication.

For HNG, the Colorado experience serves as a roadmap and a cautionary tale. Recovery will be multiyear and multifaceted, demanding **patience, coordination, and vision**. But with proactive planning, transparent engagement, and a commitment to local values, HNG can emerge not only restored, but more resilient, inclusive, and future-ready than before.

Hickory Nut Gorge Post-Disaster Recovery | This report is for educational and informational purposes only. | August 2025

Introduction and Purpose

This case study examines the long-term recovery efforts following the 2013 flooding in Colorado, with a focus on lessons learned that can inform ongoing recovery planning in the HNG region of Western North Carolina in the wake of Hurricane Helene. By exploring how mountain and river-gorge communities in Colorado navigated the transition from short-term emergency response to multiyear, community-driven recovery initiatives, this case study aims to support local planners, emergency managers, and stakeholders in the HNG area as they set expectations and design recovery strategies that are realistic, resilient, and grounded in lived experience.

Objectives

The primary objectives of this case study include the following:

- Empower HNG community leaders and planners with a realistic understanding of the pace, complexity, and opportunities inherent in long-term disaster recovery.
- Extract actionable insights and replicable practices from Colorado's experience—especially in areas where communities encountered challenges and overcame them through coordination, innovation, or persistence.
- Highlight how strategic recovery planning can align community needs with infrastructure, environmental, and regulatory goals.
- Provide a framework for stakeholders to initiate and sustain long-term recovery efforts tailored to HNG's values and landscape.

Why the 2013 Colorado Floods?

The communities impacted by Colorado's 2013 floods share key geographic and socio-economic characteristics with those in HNG. Both are located in rugged, river-gorge settings where narrow transportation corridors, tourism economies, and dispersed infrastructure magnify the consequences of natural disasters. Like HNG, Colorado's communities were deeply affected by flooding that washed out bridges and roads, overwhelmed water treatment systems, displaced residents, and disrupted critical services.

Importantly, several of these Colorado communities responded not just by rebuilding but by fundamentally rethinking how and where to rebuild—launching long-term recovery planning efforts within a few months of the disaster. Over the following decade, they implemented resilience-focused projects, negotiated complex regulatory environments, and **rebuilt stronger infrastructure** that often served both community and ecological needs. Their experience offers practical insights into what worked, what stalled, and what lessons might guide HNG's own long road to recovery.

Scope of the Case Study

This case study focuses on four key domains of recovery:

- **Infrastructure**—including transportation networks, utilities, and public services
- **Recreation and River Access**—with attention to dual-purpose projects that serve both flood mitigation and community use
- **Environmental Restoration**—especially riparian habitat, water quality, and watershed resilience
- **Community Services and Engagement**—including housing, public health, social services, and resident participation in recovery planning

Throughout the case study, we emphasize the transition from immediate recovery actions (e.g., emergency repairs) to strategic, community-led long-term planning, drawing out replicable models and cautionary lessons relevant to the HNG context.

Approach

The case study is structured thematically, tracing the recovery arc from initial response to multiyear implementation. Each section integrates both quantitative data (e.g., timelines, funding figures, project milestones) and qualitative insights (e.g., community anecdotes, interview excerpts). Specific attention is given to the processes that enabled or hindered long-term recovery: interagency coordination, permitting frameworks, funding mechanisms, and community engagement.

By contextualizing these lessons within the ongoing recovery needs of the communities within HNG, this case study serves as a guide to help local leaders shape a recovery process that is not only effective—but also inclusive, resilient, and locally grounded.

Background: The 2013 Colorado Flood Event

In September 2013, a slow-moving storm system brought prolonged, intense rainfall to the Front Range of Colorado, triggering widespread flash flooding across 17 counties. Communities in narrow, river-adjacent valleys—particularly those in Boulder, Larimer, and Weld counties—were among the hardest hit. Thousands of homes and businesses were damaged or destroyed, and vital infrastructure such as highways, water systems, and public buildings suffered extensive losses.

Meteorological and Hydrological Overview

From September 9 through 16, 2013, parts of Colorado received 15 to 20 inches of rain—an amount exceeding annual averages for many locations. The heaviest precipitation occurred along the Front Range, where steep topography and converging weather systems led to rapidly rising rivers and creeks.

Hydrological impacts included the following:

- Record-setting streamflow on rivers such as the St. Vrain, Big Thompson, and Cache la Poudre
- Flood stages exceeding the 100-year return interval in several locations, with some events approaching or exceeding the 500-year threshold
- Widespread debris flows and river avulsions that reshaped channels and floodplains

The topography of Colorado's Front Range—characterized by narrow canyons, limited transportation corridors, and development along riverbanks—exacerbated the flooding's severity. These same factors also complicated emergency response and recovery operations, similar to challenges anticipated in HNG.

Affected Communities: Lyons and Estes Park

This case study focuses on two Colorado communities: Lyons and Estes Park. Both towns are located in mountain river corridors that serve as gateways to popular recreational areas. Their experiences offer distinct yet complementary perspectives on disaster recovery, including differences in economic base, damage severity, and recovery approaches.

Lyons, Boulder County

- **Population (2013):** ~2,000 residents
- **Setting:** At the confluence of the North and South St. Vrain Creeks; steep canyon walls and limited transportation routes in/out of town.
- **Economic Base:** A mix of tourism, small businesses, and arts/culture.
- **Flood Impact:** 20% of the town's housing stock was destroyed, including an entire mobile home park. Water and sewer infrastructure was wiped out. All access roads were cut off for days. Most residents were evacuated by helicopter.
- **Recovery Planning:** Lyons launched a Long-Term Recovery Action Plan within 2 months of the flood, guided by nine citizen-led working groups. The plan covered housing, parks, infrastructure, and economic recovery, and became the town's foundational document for pursuing funding, partnerships, and regulatory approvals.

Estes Park, Larimer County

- **Population (2013):** ~6,000 residents
- **Setting:** Headwaters of the Big Thompson River; major entry point to Rocky Mountain National Park.
- **Economic Base:** Heavily reliant on tourism, particularly lodging, dining, and outdoor recreation.

- **Flood Impact:** Significant road damage cut off access to and from the town. Flooding disrupted water treatment facilities and damaged several neighborhoods and commercial areas.
- **Recovery Planning:** Larimer County and the Town of Estes Park formed joint recovery working groups and undertook extensive transportation and river corridor planning. Though not as formally consolidated as Lyons's plan, the town adopted a long-range recovery strategy integrated with **capital improvement programming** and **floodplain revisions**.

Both communities faced a common realization: long-term recovery required more than rebuilding—it required *rethinking*. Through early community engagement and coordination with state and federal partners, they initiated planning efforts that shaped their recovery over the next decade.

Immediate Impact and Emergency Response

The September 2013 floods delivered a swift and punishing blow to Colorado's Front Range communities. Entire stretches of highway collapsed under the force of rising rivers, neighborhoods were inundated, and essential infrastructure—bridges, water treatment plants, electrical grids—was destroyed or rendered inoperable. Communities like Lyons and Estes Park were among the hardest hit, both geographically isolated and logistically paralyzed in the days following the disaster.

In Lyons, floodwaters devastated the town's core. Roads leading in and out were completely severed, and over 20% of the town's housing stock—including an entire mobile home park—was destroyed. Critical systems, including water, sewer, and power, failed simultaneously, forcing a complete evacuation. A town official later described surveying Main Street as akin to **"navigating a river delta more than a roadbed,"** capturing the transformative violence of the event and the enormity of the recovery task ahead.

State and federal agencies quickly mobilized to stabilize the region. The National Guard executed what would become the largest domestic airlift operation since Hurricane Katrina, extracting over 1,200 people from otherwise unreachable areas. Simultaneously, the Colorado Department of Transportation (CDOT) deployed crews around the clock, pushing gravel and culverts into place and installing emergency bridges to reconnect isolated towns. Within just 30 days, Lyons—once entirely cut off—had regained vehicular access, a critical milestone that allowed emergency responders and town staff to resume limited operations.

Despite the urgency of these early efforts, many local leaders understood that recovery could not be limited to patchwork fixes. Within weeks of regaining basic access, both Lyons and Estes Park began laying the foundation for long-term recovery planning. These initial actions included convening working groups, initiating damage assessments not just for federal aid but for local priority-setting, and reaching out to residents for input. Even as shelters were still operating and emergency crews

continued debris removal, **community members were already envisioning how they would rebuild—not just to return to what was, but to emerge stronger, safer, and more cohesive**.

Infrastructure Recovery

The path from emergency access to full infrastructure restoration was long and complex, often stretching over a decade. In the immediate aftermath of the flood, CDOT and local jurisdictions worked feverishly to establish temporary connections. Major corridors like U.S. 36, CO 7, and US 34—lifelines into mountain communities—were reconnected with emergency repairs, including gravel roads, culverts, and modular bridges within weeks. This rapid response prevented total economic collapse in tourism-dependent towns like Estes Park, which was able to reopen access in time for the holiday season.

However, these stopgap measures were just the beginning. As emergency repairs held the line, planners and engineers began designing permanent solutions that would not merely restore but *reimagine* Colorado's transportation infrastructure. Roads that had once clung precariously to canyon walls were elevated or relocated. Highway shoulders were widened to support multimodal use, and new culverts were installed at sizes capable of accommodating future high-flow events. In the Big Thompson Canyon and along CO 7—key arteries leading into Estes Park and Lyons—designers embraced **integrated river-road systems**, allowing rivers to migrate naturally while protecting transportation assets.

This long-term work required substantial and sustained funding. Federal resources came primarily from the Federal Emergency Management Agency (FEMA) Public Assistance program and the Federal Highway Administration Emergency Relief (FHWA ER) fund. Yet these programs were reimbursement-based, placing tremendous strain on smaller towns like Lyons that lacked the up-front capital to begin work. While Lyons had $75 million in FEMA funding obligated within the first few years, only a portion was disbursed promptly. To close the gap, Colorado provided state matching funds and low-interest bridge loans, while local governments turned to bond measures and reserve accounts.

Coordination across agencies also proved critical—and sometimes challenging. The regulatory environment required navigation through overlapping jurisdictions and program requirements. Early permitting delays led Colorado to adopt the Unified Federal Review (UFR) process, aligning environmental and historic preservation approvals across agencies like FEMA, FHWA, and the State Historic Preservation Office. In tandem, **CDOT negotiated programmatic agreements that precleared common infrastructure project types**, such as standard bridge replacements. These tools helped to streamline approvals and avoid redundant reviews, offering valuable models for other regions facing complex recovery environments.

Utility systems followed a similar two-phase arc. In the weeks following the flood, power and potable water were restored through mutual-aid crews, generator deployment, and tanker service. In Lyons, a temporary water intake and trailer-mounted wastewater treatment unit allowed for partial repopulation within a month. But permanent repairs took far longer. **Communities relocated vulnerable infrastructure outside of flood zones, buried power lines, and installed backup systems**. Funding again came from a mix of FEMA, Housing and Urban Development (HUD) Community Development Block Grant Disaster Recovery (CDBG-DR), and Hazard Mitigation Grant Program (HMGP) resources.

These upgrades were often pursued not only to restore service, but to improve long-term reliability and resilience. Yet they were not without complications. Utility projects triggered environmental reviews similar to transportation infrastructure, and jurisdictions often encountered uncertainty about permit authority and sequencing. Eventually, the establishment of **Disaster Unified Review Teams** helped consolidate these reviews and clarify pathways to approval.

In both roads and utilities, the key turning point was a shared commitment to pivot quickly from triage to transformation. By pairing engineering innovation with regulatory flexibility and financial creativity, Colorado communities laid the foundation for infrastructure systems designed not just for recovery—but for the future.

Recreation and River Access

The 2013 floods left Colorado's river towns not only physically damaged but **emotionally disconnected from the natural landscapes that helped define their identity**. Parks were submerged or torn away entirely. Trails vanished beneath sediment and debris. Boardwalks, boat ramps, and river access points—features that tied communities to their rivers—were damaged beyond recognition. In towns like Lyons and Estes Park, where outdoor recreation plays a vital role in local culture and economy, the loss extended well beyond infrastructure; it was a disruption of daily life, mental wellbeing, and civic pride.

In the weeks immediately following the flood, public attention naturally focused on life safety, housing, and transportation. Recreational spaces were deemed nonessential and were often left off early funding lists. But residents and local officials in both towns quickly recognized that parks and trails were more than amenities—**they were gathering spaces, economic drivers, and tools for community healing**. The reopening of even small segments of trail or a single riverside picnic area offered a powerful signal of progress and normalcy.

As recovery transitioned from immediate response to long-term planning, both communities made deliberate decisions to prioritize river corridor restoration—not in competition with housing or utilities, but as an integral part of holistic recovery. Lyons, in particular, embedded recreation into its

long-term vision by developing a Parks, Open Space, and Trails (POST) Master Plan that became a cornerstone of its Recovery Action Plan. The plan was informed by public workshops, working groups, and youth engagement initiatives, ensuring that the rebuilt park system reflected local values and use patterns.

Importantly, the new park designs were not carbon copies of what had been lost. Instead, they embraced principles of **resilience and multifunctionality**. In Bohn Park, for instance, riverbanks were reshaped using bioengineering techniques—willow staking, log revetments, and floodplain terraces—not just to resist future floods but to create inviting access points for kayakers, anglers, and families. Trails were realigned out of active floodways, elevated where needed, and surfaced with permeable materials to better absorb runoff. Recreational features such as whitewater play areas, restored natural pools, and open green space were integrated with flood conveyance zones, ensuring that future high water could flow freely without destroying public assets.

These dual-purpose solutions reflected a growing consensus: infrastructure should serve multiple goals. In the years following the flood, projects were increasingly evaluated not only for their engineering specifications or economic return, but for their capacity to restore social and ecological connection. In Estes Park, similar principles guided the rebuilding of the Riverwalk downtown—a pedestrian corridor that doubles as a flood buffer and community event space. The town also prioritized repairing access points for fishing and rafting, key components of its tourism economy.

Securing funding for these efforts, however, required persistent advocacy. FEMA's Public Assistance program initially excluded many park and trail features from eligibility. Local leaders had to make the case—through both technical justifications and community organizing—that recreational infrastructure was not optional. Through partnerships with the State of Colorado, philanthropic donors, and the use of **flexible CDBG-DR funding**, many of these projects ultimately moved forward. The process underscored a critical lesson: long-term recovery planning must include recreation from the outset, or risk losing it entirely.

Business owners in the recreation sector also played an important role in recovery. Outfitters, campground operators, and river guides not only lobbied for infrastructure repairs but offered informal damage assessments, local knowledge, and even volunteer labor. Some participated in economic recovery task forces and served as bridges between the business community and public officials. For example, a local rafting company in Lyons worked with engineers to help re-establish river channels in ways that supported both safety and flow dynamics favorable to paddlers—resulting in better outcomes for all users.

The benefits of this collaborative, multi-use approach are still evident today. Trails are more durable. Parks are more accessible. Rivers are healthier and safer. The lessons for HNG are clear: if the community values recreation, then integrating recreation into long-term recovery is not a luxury—**it is an investment in the social, environmental, and economic fabric of the community**. And when designed with purpose, recreational infrastructure can serve not only as a symbol of recovery, but as a **critical component of resilience**.

Environmental Recovery

The environmental consequences of the 2013 Colorado floods were as sweeping as the damage to homes and roads. In the span of a few days, rivers abandoned their channels, carving new paths across fields, neighborhoods, and industrial zones. Entire riparian corridors were uprooted. Tons of woody debris and sediment were deposited downstream, often in places ill-equipped to handle the sudden influx. The resulting ecological disruption posed risks not only to habitat, but also to water quality, public safety, and the pace of infrastructure repair.

Initially, environmental recovery took a backseat to more visible and urgent needs—clearing roads, restoring power, relocating displaced residents. But as the weeks passed and the scale of ecological disturbance became clearer, Colorado's recovery strategy began to shift. Community leaders, state agencies, and environmental groups recognized that long-term success required an **integrated approach: rebuilding infrastructure, restoring habitat, and managing watersheds as interdependent systems.**

As HNG also experienced, one of the first major challenges was debris management. Floodwaters deposited massive quantities of logs, sediment, building materials, and trash across public and private land. Clearing this material became a logistical and jurisdictional puzzle. While municipalities were responsible for major corridors and public spaces, landowners were often left to deal with debris on their own properties. In Boulder County alone, thousands of volunteer hours were organized for community cleanup days—an effort that not only sped up recovery but reinforced community bonds.

Beyond immediate cleanup, the longer-term task of habitat restoration demanded a more strategic, science-based approach. Streambanks, stripped of vegetation and destabilized by scouring flows, were highly vulnerable to erosion in subsequent rain events. In response, state and local partners deployed a range of **bioengineering techniques: live willow staking, coir logs, anchored woody debris, and native grass seeding**. These methods not only stabilized channels but **helped re-establish the ecological integrity of riparian zones**.

In Lyons and surrounding areas, environmental goals were often paired with infrastructure needs. For instance, while rebuilding roads and bridges, project teams also restored adjacent stream segments, allowing for more natural flow patterns and floodplain reconnection. This approach created co benefits: reduced erosion risk for infrastructure, improved aquatic habitat, and enhanced resilience for future flood events. Estes Park implemented similar strategies in areas where the Big Thompson

River had overtopped banks and destroyed trail networks. New designs prioritized **natural channel geometry and revegetation** over hard armoring alone.

A turning point in Colorado's environmental recovery came with the launch of the **Comprehensive Creek Planning Initiative**, a coordinated effort among counties, watershed coalitions, and the Colorado Water Conservation Board. Through this initiative, local and regional stakeholders developed **creek-specific master plans** that prioritized projects based on risk, feasibility, and ecological value. These plans became blueprints for long-term investment, guiding the allocation of grants and serving as justification for federal and state funding.

One of the most successful examples of this approach was the **Creek Recovery and Restoration Program in Boulder County**. Drawing from the master plans, the county implemented dozens of restoration projects over several years, often in tandem with transportation and utility work. These projects restored fish passage, stabilized banks, reconnected floodplains, and reduced sediment loading—all while ensuring public safety and infrastructure protection.

Water quality monitoring also evolved as a key element of long-term recovery. In the weeks following the flood, emergency testing revealed elevated turbidity and contaminants in some waterbodies. As conditions stabilized, agencies and citizen science groups initiated long-term monitoring to track trends and identify hot spots. These programs helped fill critical data gaps and informed adaptive management of restoration sites.

Over time, Colorado communities came to understand that **environmental recovery** was not a separate track, but a **central pillar of overall resilience**. It required a level of coordination that was often new and challenging—blending the efforts of **public works departments, conservation organizations, regulators, and landowners**. Yet the results were tangible: **restored habitat corridors, cleaner rivers, and landscapes better prepared for future storms.**

For regions like HNG, the Colorado experience underscores the value of elevating environmental recovery from the start. By **integrating ecological goals into infrastructure and land use planning**—and by **treating rivers** not as hazards to contain, but **as systems to understand and steward**—communities can rebuild in ways that are **not only stronger, but more sustainable**.

Key Services and Community Resilience

Even as bulldozers cleared roads and engineers drew up new infrastructure plans, Colorado's mountain communities faced another, quieter challenge: how to restore the fabric of daily life. Flooding had not only torn up physical infrastructure but fractured essential services—clinics, schools, community centers—that held neighborhoods together. Rebuilding these services—and **restoring the trust and participation of residents**—would become a defining element of long-term recovery.

In Lyons, the destruction of water and wastewater systems rendered the town uninhabitable for weeks. As families relocated—some temporarily, some permanently—the strain on nearby schools and healthcare providers grew. Children were bussed to alternate school districts; medical appointments were shifted to clinics in other towns. Estes Park, while spared some of the worst utility damage, also faced service disruptions and road closures that limited access to care, groceries, and emergency assistance.

Recovery of key services followed a layered timeline. Some clinics and schools reopened quickly, leveraging backup power and temporary facilities. But others required substantial repairs or relocations, particularly in floodplain areas. In several communities, schools were pressed into dual use, functioning as shelters, command centers, or food distribution hubs before returning to educational roles. These adaptations were critical in the early weeks, but they also revealed deeper vulnerabilities in the region's service networks—such as the lack of redundant systems, limited behavioral health capacity, and insufficient access to transportation for displaced residents.

Mental health, in particular, emerged as a long-term need that often lagged behind more visible recovery metrics. While the physical signs of damage could be catalogued and measured, the emotional toll of displacement, loss, and uncertainty unfolded over months and years. Recognizing this, Colorado's recovery leadership worked with nonprofit partners to **expand access to counseling services, peer support groups, and school-based mental health programs**. In Lyons, grief counseling and trauma-informed workshops were offered to both children and adults. The state also funded outreach teams to conduct door-to-door wellness checks and distribute information on available services.

Central to these efforts were the region's Long-Term Recovery Groups—local coalitions formed to coordinate aid, volunteer labor, and case management for individuals with unmet needs. Groups in Boulder, Larimer, Weld, and El Paso counties played a critical role in matching residents with resources, helping them navigate the complexity of federal programs, insurance claims, and construction timelines. These groups filled gaps that no single agency could cover and became trusted sources of information and advocacy.

At the same time, community engagement was not just about receiving services—it became a mechanism for shaping recovery itself. In Lyons, the long-term recovery planning process was intentionally designed to be participatory. Nine citizen-led working groups tackled everything from housing to infrastructure to economic development. Public workshops, open houses, and digital surveys **allowed residents to express their priorities, challenge proposals, and track progress**. This model of embedded civic participation **created buy-in and transparency**, helping to reduce frustration during inevitable delays and course corrections.

Estes Park employed similar strategies, convening recovery task forces with representation from businesses, nonprofits, and neighborhood associations. These groups did not just give input; they **co-created** solutions. For example, the town's riverwalk restoration plan was adjusted in response to concerns from mobility-impaired residents, and trail alignments were modified to balance habitat preservation with community access.

Maintaining consistent, honest communication throughout the recovery process proved essential. Officials used town halls, newsletters, and social media to **update the public, manage expectations, and explain delays**—particularly in navigating federal reimbursement or permitting requirements. In doing so, they helped transform what could have been passive recipients of recovery into active participants and watchdogs.

Perhaps most importantly, these efforts helped cultivate a deeper resilience—one not measured solely by rebuilt structures but by stronger relationships, institutional trust, and civic capacity. As anniversaries of the flood approached in subsequent years, community events, remembrance ceremonies, and **storytelling projects helped process collective grief while celebrating progress**.

The experience in Colorado demonstrates that resilience is built not just through engineering, but through inclusion. For HNG, the lesson is clear: **investing in people and process** is just as vital as investing in roads and buildings. By fostering community ownership of recovery, and by sustaining services that meet emotional as well as physical needs, towns can emerge from disaster not only restored—but renewed.

Cross-Cutting Challenges and Solutions

Throughout the long arc of recovery in Colorado, communities encountered a series of persistent, interconnected challenges that transcended any single sector. These cross-cutting challenges—issues that affected multiple aspects of recovery simultaneously—often proved to be the most difficult to manage. They were not limited to roads or housing or environmental restoration alone, but rippled across the entire recovery landscape, influencing timelines, straining local capacity, and testing institutional coordination.

Among the most consequential of these was the complexity of funding. While federal aid was substantial, it was also fragmented and reimbursement-based. Towns like Lyons were eligible for millions in FEMA Public Assistance and other disaster recovery programs, but those funds could not be accessed up front. Instead, local governments were required to spend first and wait—sometimes months or years—for federal reimbursement. For a small town with limited reserves and borrowing capacity, this created cash flow crises that slowed progress and strained relationships with contractors and residents alike. The state attempted to bridge the gap with matching grants and

loans, but the structural misalignment between local needs and federal systems remained a constant pressure point.

Permitting and regulatory hurdles posed a second major challenge. As communities moved from emergency repair into long-term reconstruction, they were required to navigate an array of environmental, historical, and engineering reviews—often from multiple agencies with overlapping jurisdictions. At times, compliance with one set of regulations would delay or even conflict with another. In Estes Park, for instance, an effort to use nearby reservoir material for road rebuilding was stalled for months due to federal environmental review requirements—until direct intervention from higher-level officials resolved the impasse. These experiences revealed the need for greater alignment and flexibility within the regulatory framework, especially when time-sensitive recovery projects are at stake.

Workforce capacity was another recurring barrier. The sheer volume of construction—combined with the geographic isolation of some communities and the seasonal limitations of mountain weather—strained available labor markets. Specialized contractors were in short supply, and smaller municipalities often found themselves competing with larger jurisdictions for skilled labor, equipment, and engineering services. In some cases, projects were delayed not for lack of funding or design, but because no qualified firm was available to do the work within the required time frame.

Community fatigue emerged as a more subtle, but no less significant, cross-cutting challenge. As recovery timelines extended from months to years, many residents grew weary of delays, shifting priorities, and the emotional toll of prolonged disruption. Anniversaries of the flood often reignited trauma, while unresolved issues—such as housing gaps or unfulfilled reimbursements—became sources of frustration and distrust. In Lyons, town staff noted that managing community expectations became nearly as demanding as managing contractors. **Transparent communication, regular public updates, and the celebration of small wins** were all deployed as strategies to maintain morale and reinforce a shared sense of progress.

To address these cross-cutting issues, Colorado developed a number of innovative approaches. One of the most effective was the UFR process, which brought together federal agencies to conduct coordinated environmental and historic preservation reviews. This reduced redundancy, accelerated project approvals, and served as a model for future multi-agency recovery efforts. The state also negotiated programmatic agreements for recurring project types—such as bridge replacements—allowing for streamlined permitting under predefined conditions.

In addition, mutual-aid frameworks were activated and expanded. Local governments shared staff, equipment, and technical expertise. Projects were bundled to attract regional contractors, and joint task forces were established to solve coordination bottlenecks. Some towns hired dedicated

"recovery navigators" to guide residents through paperwork, grant applications, and appeals processes—recognizing that the burden of recovery fell as heavily on individuals as on institutions.

For the communities within HNG, these experiences offer not just cautionary tales, but practical guidance. Cross-cutting challenges will likely emerge in the aftermath of Hurricane Helene: misaligned funding cycles, overlapping agency requirements, contractor shortages, and public frustration. By anticipating them—and by putting coordination tools, communication channels, and regulatory flexibilities in place ahead of time—local leaders can reduce the friction that so often delays recovery.

Ultimately, the Colorado experience underscores that solving technical problems is only part of the equation. It is equally important to **solve process problems**—the threads that connect projects, people, and institutions. When these threads are frayed or tangled, recovery stalls. But when they are strong and well-coordinated, communities can move forward with greater speed, confidence, and resilience.

Lessons Learned and Recommendations

Twelve years after the 2013 floods, Colorado's recovery story is still unfolding—but the contours are now visible. Bridges have been rebuilt, parks reopened, homes restored, and rivers rechanneled. More importantly, communities like Lyons and Estes Park have emerged with deeper institutional knowledge, stronger interagency relationships, and a shared understanding of what it means to recover not just fully—but wisely. Their journey offers a wealth of insight for other mountain and river-gorge communities confronting the aftermath of natural disasters. For HNG, these lessons are especially timely.

One of the clearest lessons from Colorado is the importance of initiating long-term recovery planning as early as possible. In Lyons, planning conversations began within weeks of the flood, even before some utilities had been restored. The town formed citizen working groups, collected community input, and developed a Recovery Action Plan that became its roadmap for everything from housing to parks to infrastructure. This early commitment to visioning did not replace emergency response—it complemented it. By **setting goals and priorities** in parallel with short-term repairs, Lyons was able to advocate more effectively for funding, coordinate across agencies, and avoid reactive decisions that might have compromised future resilience.

Equally important was the community's effort to manage expectations. In the early months, residents and local officials alike hoped for a full recovery within 2 to 4 years. But as regulatory requirements, funding delays, and labor shortages compounded, it became clear that the timeline would be far longer. Lyons's administrator later reflected that realistic messaging—acknowledging the complexity of recovery, explaining delays, and **celebrating incremental progress**—was critical in sustaining

public trust. For HNG, this means communicating clearly from the outset: full recovery will take years, not months. But with shared goals and transparent processes, **progress will be measurable and meaningful.**

Another key takeaway is the value of community-driven priorities. In Colorado, the most successful recovery projects were those **grounded in local values**—whether that meant restoring a beloved park, rebuilding affordable housing, or preserving a historic downtown corridor. In Lyons, for example, residents fought to ensure that recreational infrastructure, often dismissed as nonessential, was rebuilt not only for visitors but **for locals who relied on riverside parks for daily wellbeing**. In Estes Park, accessibility and tourism coexisted in planning conversations, resulting in infrastructure that served both. HNG communities have already signaled a desire to prioritize local needs over tourism interests. Colorado's experience affirms that this is not only possible—it is strategic. A **recovery that puts residents first** tends to be **more equitable, more sustainable,** and ultimately more supported by the public.

Coordination across agencies emerged as both a recurring challenge and a site of innovation. Colorado's adoption of the UFR process significantly reduced delays by aligning environmental and historical reviews. Programmatic agreements between FEMA, CDOT, and other regulatory bodies allowed towns to bypass redundant permitting for common project types. These process solutions were not flashy, but they were game-changers. For HNG, the implication is clear: **streamlining interagency coordination—and doing so proactively—can prevent years of delay**. Local officials may consider working now to establish emergency permitting frameworks, pre-approve standard designs, or negotiate interagency agreements that activate after major disasters.

The idea of "building back better" was not a slogan in Colorado—it was a necessity. Reconstructed roads were elevated and widened, bridges redesigned to accommodate higher flows, utilities relocated out of floodplains. In some places, parks were moved or reshaped to double as floodwater buffers. These changes required additional time, funding, and community buy-in, but they also reduced future risk. A notable example was the CO 7 corridor, where a temporary asphalt fix was replaced with a complete realignment that improved safety, river health, and cyclist access. HNG can adopt a similar mindset: every repair is an opportunity to reduce vulnerability and enhance quality of life. This might mean upsizing culverts, integrating green infrastructure, or restoring natural stream buffers that serve both ecological and protective functions.

Finally, Colorado's recovery experience highlights the need to treat housing and social services as infrastructure. While bridges and roads dominate headlines, it was the loss of housing—and particularly affordable housing—that had the most lasting social impact. In Lyons, an entire mobile home park was swept away, displacing dozens of families. A decade later, rebuilding affordable units has proven one of the most difficult challenges. Meanwhile, unmet mental health needs persisted long after physical rebuilding began. These are not secondary concerns. For HNG, long-term

recovery planning should include strategies for maintaining or expanding housing stock, supporting vulnerable populations, and ensuring that social infrastructure is restored with the same urgency as physical infrastructure.

Each of these lessons is actionable. They can be translated into policies, frameworks, and practices before the next crisis—or while current recovery efforts are still taking shape. Here are a few examples of such actions:

- **Form a regional recovery task force** that includes not just emergency managers and engineers, but planners, public health officials, nonprofit leaders, and residents.
- **Develop a permitting playbook** with pre-approved templates for stream crossings, temporary utilities, or debris removal, to avoid regulatory gridlock.
- **Prioritize dual-purpose projects**—like greenways that also serve as flood buffers or schools that double as shelters.
- **Create a transparent tracking system** for recovery milestones to keep the public informed and engaged.

In the end, perhaps the most important recommendation is to treat recovery not as a return to the past, but as an **investment in the future**. Colorado's flood-affected communities seized that opportunity, often under great strain and with limited resources. Their progress was not linear, and it was not easy. But it was possible—because they committed to long-term thinking, collaborative action, and community-led solutions. HNG can do the same.

Conclusion

The 2013 Colorado floods left a mark not only on the landscape, but on the systems, institutions, and relationships that shape how communities recover. What began as an emergency response unfolded into a years-long process of reconstruction, reevaluation, and in many ways, **reinvention**. Through it all, towns like Lyons and Estes Park demonstrated that successful recovery is not merely about restoring what was lost, but about deliberately building a stronger, more resilient future—one decision, one project, and one conversation at a time.

This case study has explored how those communities navigated the transition from crisis to coordination, from short-term repairs to long-term resilience. The most valuable insights are not found in any single project or funding source, but **in the strategies they used to overcome setbacks, align competing interests, and sustain momentum over a decade of recovery**. They planned early. They prioritized community needs. They demanded flexibility from regulatory systems. They invested in relationships as much as in infrastructure.

For the HNG region, the Colorado experience offers a guidepost. The road to recovery after Hurricane Helene will not be identical, but it will be shaped by many of the same challenges: the

Appendix A

Recovery Timeline: Colorado Case Study Communities

This timeline highlights major milestones in long-term recovery for the communities of Lyons and Estes Park, emphasizing the transition from short-term to long-term planning and the typical pacing of project completion.

Phase	Milestone	Approximate Timing (Post-Flood)
Initial Response	Evacuations, temporary road access, emergency shelters	Weeks 1 through 4
Early Recovery	Basic utility restoration, temporary school relocations	Months 2 and 3
Planning Launch	Long-Term Recovery Plan (Lyons) developed	Month 3
Infrastructure Design	Permanent roadway and bridge designs initiated	Months 3 through 6
Environmental Planning	Watershed master plans commissioned	Months 6 through 12
Capital Projects Begin	Road, utility, and park reconstruction initiated	Years 1 and 2
Resilience Integration	Relocated/flood-proofed infrastructure, river corridor redesign	Years 2 through 5
Project Completion	Final permanent road projects (e.g., CO 7) finished	Years 8 and 9
Long-Term Outcomes	Updated hazard mitigation plans	

Appendix B

Sample Recovery Plans and Frameworks

1. Lyons Long-Term Recovery Action Plan (2014)

   Link to full document:
   https://townoflyons.com/DocumentCenter/View/388/LyonsRecoveryActionPlan FullResolution

   Highlights:

   - Born from an intense citizen-driven process in January and February 2014, with ~150 residents across nine working groups covering topics such as **housing, infrastructure, parks, economic development, and watershed recovery.**
   - Defines actionable projects—e.g., rebuilding the historic Confluence neighborhood raised 2 feet above base flood elevation, creating a business recovery fund, and downtown infrastructure enhancements.
   - Introduces resilience building by updating floodplain codes, establishing a revolving loan fund for businesses, and communicating recovery progress proactively to restore investor confidence.
   - Served as the basis for environmental actions, such as the Lyons Parks Flood Recovery Plan, and continued into formal sustainability planning supported by local nonprofit organizations.

2. Boulder County Comprehensive Creek Planning Initiative (2015)

   Link to full document:
   https://assets.bouldercounty.gov/wp-content/uploads/2017/03/ccp-bocc-presentation-jan-2015.pdf

   Highlights:

   - Launched within months of the flood, the county hosted over 15 community meetings with 650+ participants, collecting data to map hazards like debris piles, unstable banks, and bridge risks.
   - Produced watershed-level master plans by December 2014 for eight creek systems, **linking environmental restoration to adjacent road and bridge projects.**
   - Guided early-stage interventions and informed updates to floodplain maps and policies; now known as the **Creek Recovery and Restoration Program**, implementing prioritized projects using multi-source funding.

3. Boulder Creek Restoration Master Plan (2015)

   Link to full document:
   https://assets.bouldercounty.gov/wp-content/uploads/2017/02/lower-boulder-creek-master-plan.pdf

   Highlights:

   - Developed collaboratively by the Urban Drainage and Flood Control District (UDFCD), City of Boulder, Boulder County, and Longmont following 2013 flooding.
   - Covers approximately 24 miles of creek—from Boulder Canyon to Longmont—offering **geomorphic assessments, natural channel design guidelines, habitat enhancement strategies, and floodplain reconnection plans.**
   - Includes cost estimates (~$69.5 million) and identifies nine project reaches; **integrates recreation and flood mitigation approaches**, with geospatial project mapping and community integration.

4. Colorado Resiliency Framework (2015, updated 2020)

   Link to full document:
   https://drive.google.com/file/d/1efF8j0JLAmAnxi8_U4jq75uEWTAKxrGm/view

   Highlights:

   - First statewide resilience framework in the United States, launched after the 2013 floods and updated in 2020 to include community capacity, housing, infrastructure, watersheds, and social equity as priority areas.
   - Introduces the Resiliency Playbook and Prioritization Assessment Tool to help agencies **evaluate projects against resilience metrics**.
   - Structured around six focus areas—buildings/infrastructure, natural hazards, watersheds/natural resources, housing, economy, and community capacity—offering a template for holistic recovery planning.

Appendix C

Recovery Task Forces and Stakeholder Structures

1. Lyons Recovery Working Groups

   Overview: Initiated in December 2013, approximately 3 months after the flood, the Town of Lyons convened nine **citizen-led working groups** covering Housing, Infrastructure, Parks & Recreation, Business/Economic Development, Arts & Culture, Public Facilities, Health & Human Services, Historic Preservation, and Stream Recovery.

   Structure and Process: Each group met weekly for 6 weeks, supported by the Federal Emergency Management Agency (FEMA) and Colorado Department of Local Affairs facilitators. Participants developed over 50 project proposals, refined them into detailed Project Development Guides, and contributed directly to the final Recovery Action Plan.

   Key Outcomes:

   - Elevated the Confluence neighborhood above flood elevation.
   - Established a business recovery fund and incorporated floodplain resilience into municipal standards.
   - Launched sustainability policies, public communications systems, and watershed restoration initiatives.

   Link to Official Overview:

   Town website description:
   https://townoflyons.com/DocumentCenter/View/388/LyonsRecoveryActionPlan-FullResolution

2. Estes Park Recovery & Business Committee

   Membership & Purpose: After declaring disaster recovery needs, the Town of Estes Park and Larimer County formed a joint committee of local business owners, city officials, and residents. Charged with economic revitalization, communications, and feedback, the committee helped shape capital improvement decisions that balanced recovery with tourism and ecological priorities.

   Key Functions:

   - Advocated for repairs to river access points and downtown flood-buffer features.
   - Provided input on trail re-openings and business support programs.

   Supporting Documentation: Commonly referenced in the Town's "Flood Recovery Strategy & Capital Improvement Program," 2015.

3. County-Level Long-Term Recovery Groups (LTRGs)

   Focus & Reach: In Boulder, Larimer, Weld, and El Paso counties, non-profits and local agencies established **LTRGs** to ensure residents received support during medium- to long-term recovery.

   Roles & Activities:

   - Managed casework for individuals and families, including navigating insurance and grant applications.
   - Organized volunteer labor, coordinated donations, and connected families to partner services.
   - Hosted regular recovery coordination meetings to identify community needs, track resources, and liaise with government and service providers.

   Impact for Hickory Nut Gorge: These groups exemplify a homegrown support system that extends beyond infrastructure recovery—addressing lived experience, wellness, and equity through sustained engagement.

4. State/Federal Interagency Coordination (Unified Federal Review Teams)

   Purpose: Colorado implemented the **Unified Federal Review (UFR)** process—bringing together FEMA, Federal Highway Administration (FHWA), U.S. Army Corps of Engineers (USACE), State Historic Preservation Office (SHPO), and other agencies to **streamline permitting and environmental reviews for flood recovery projects.**

   Achievements:

   - Reduced redundancy in environmental/historic reviews.
   - Created programmatic agreements for recurring infrastructure types (like bridge repair), allowing faster approvals under predefined conditions.
   - Resulted in significant time savings and predictability in review processes.

5. Mutual-Aid and Resource-Sharing Structures

   Examples:

   - Lyons received emergency operational and utility staff support from Longmont and Aurora Water.
   - The National Guard and neighboring towns provided engineers, equipment, and temporary classroom facilities.

   Planning Model: Colorado's emergency responses became templates for formal interjurisdictional agreements—cooperative contracts that HNG could replicate for future readiness.

Appendix D

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Government & Technical Reports

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18. ASDSO—From Response to Recovery: Colorado Flooding (2020)
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19. Colorado Foundation for Water Education—Riverside Recovery: Flood Response & Stream Health (2015)
20. USDA NRCS—Emergency Watershed Protection Reports (2014–2017)
21. Cascade of Local Interviews & Town Records
    - Lyons staff oral histories
    - Estes Park stakeholder meeting minutes

Appendix E: Section 206 Letter Template

District Engineer
U.S. Army Corps of Engineers

Attn: Planning Branch [DISTRICT ADDRESS]

Dear Sir or Madam:

This letter is to request the assistance of the U.S. Army Corps of Engineers under Section 206 of the Water Resources Development Act of 1996, as amended, in aquatic ecosystem restoration in the vicinity of (CREEK, RIVER, OR BODY OF WATER) in (CITY OR TOWN).

(BRIEFLY DESCRIBE NATURE AND SEVERITY OF THE EXISTING PROBLEM AND/OR POTENTIAL BENEFITS OF A PROJECT.)

We understand that as a local sponsor under the Section 206 program, we are responsible for 50 percent of feasibility study costs exceeding $100,000 in Federal expenditures and 35 percent of project design and construction costs, if a feasible plan is identified. We acknowledge that the cost share contribution can be in the form of “in-kind” services that contribute a direct component to the study, cash or a combination. Our cost share obligation would include provision of all lands, easements, rights-of-way, relocations, and dredged material disposal areas required for the project. We intend to pursue budgetary actions so that funds are available to meet our cost sharing requirements. We would assume responsibility for operation and maintenance of the project upon completion.

The (NON-FEDERAL SPONSOR) has designated (NAME /PHONE NUMBER) as the point of contact for this project.

Sincerely, (NAME / TITLE OF OFFICIAL AUTHORIZED TO REQUEST STUDY)

Community Stories

In June of 2025, Henderson County asked members of the HNG Group to voluntarily share their stories from their experiences from Tropical Storm Helene. These were captured that not only for this plan, but also for historical record. Some of these stories have been quoted within the document.

Michael Sherrill

"Thank you all for your love and concern for our family. It's been a very difficult time. We've had almost no communication—no phone service, no internet—and continue to face major challenges. The hurricane began with a tornado. We watched the small stream in front of our home transform into a violent torrent of water, mud, trees, and boulders. It was terrifying. "Awe and wonder" took on a whole new meaning.

In the aftermath, we assessed our situation and helped evacuate 40–50 people from our valley by helicopter. Tragically, one neighbor died when a mudslide pushed her home off its foundation.

Our greatest fear was for our sons. We couldn't cross the swollen creek to reach them. At the Bat Cave bridge, now cut off, I yelled across the river for news. A friend said they'd seen Micah and Atticus. Eventually, we saw them walking toward us—alive and safe. That moment was the best, worst day of my life.

Micah lived in the apartment above the Mudtools office, our family business. That building—the heart of our operations—was swept away in the flood. Miraculously, Micah escaped with just moments to spare. He later found a painting of his late uncle and a cherished pot. We lost a lot, but not what matters most.

We're living simply—off-grid, hauling supplies, sharing with neighbors, and taking each day as it comes. Mudtools is more than a business—it's a community. Our team of 23 employees is part of that, and we're determined to rebuild so we can get back to making the tools we love and supporting the clay community.

Thank you again for your support and prayers. We are standing strong, and we will rebuild."

Harvey C. Nix III

Only the mountains bear witness to the Great Flood in July of 1916 that struck Bat Cave and Henderson county. In 1897, my great- great grandfather, Richard T. Nix and his wife, Laura Barnwell Nix, lived on the property off Hominy Branch Road where my wife and I currently reside. On Friday morning, September 27th, 2024, Hurricane Helene unleashed its fury. Thirty or so inches of rain fell in hours to an already saturated ground from 3 days of rain prior. Walls of water 30 feet high swept this beautiful land from under our feet. Livelihoods, homes, highways, and precious souls were erased, gone in an instant.

In the early hours of Friday, my wife Leslie, son Ryan, and I watched as the wind blew hard and rain fell relentlessly. Every other tree seemed to succumb, bringing an end to their hundred year old life. Power and cell service went out. As we got outside, reality set in. I could not see our driveway as it was covered in layers of downed trees. Then we discovered that our road and culvert were washed out. We were land-locked, one mile from Highway 64. Hominy Branch Road rose and became a raging river, and eradicated a 60 foot section of Highway 64. You could even hear the roar of Reedy Patch Creek from a mile away.

In first few days after the storm, normalcy was gone. No lights, no refrigerator, oven or microwave, no running water, no TV, no internet, no cellphone. Instant gratification was no more. Meal preparation is more intentional and time consuming. The day starts at sunrise, and sleep comes on the heels of a sunset. Time is spent on chores. There was more time for conversations than usual. Our daily routine harkened back to life as my great-great grandparents would have known.

As members of the Bat Cave VFD, we listened to the nightly assembly of members on the two-way radio. Chief Freeman would give an update on what was happening and where help was coming from. He would end the call with these words: "GOD is good, it's getting better everyday." It became very evident that our community was strong and alive. The voices on the radio gave us hope and made us feel that we were not alone.

No one could have foreseen what this storm brought to us, and now, even months after, some views are still incomprehensible. And worse, the losses of some people are becoming a harsh reality that getting back what was lost may never happen.

As spring came, it brought the foliage of trees which has temporarily veiled the scars of Helene from us. Maybe it's God's way of giving us respite seeing the land recover with its seasonal changes, and assurance that life continues on.

In Matthew 7:25- "And the rain fell, and the floods came, and the winds blew and beat on that house, but it did not fall, because it had been founded on the rock." I praise God for His providence since Helene.

Only when we realize that we don't live forever, that this perspective impresses on us how this land doesn't really belong to us, we belong to it. For me, I see the land with the scars of landslides like the lines on my face, from times I've cried to the times I've laughed- reminders of the brief life I've lived. Mother Earth just sees this event as another blink in time over the course of her millennia.

I am thankful to be part of Henderson county and the Bat Cave community. I am proud to call this home. Together, we will overcome.

Collin Stanford

We had heard that the storm was going to be bad, and we had already had several days of rain. It wasn't until the fire department stopped by to look at the creek that runs along the side of our home that I started to get nervous. One of the firefighters (Erik Julian) is a friend of mine, so I asked if it would be ok to evacuate to his home on top of Bearwallow Mountain if it got bad enough.

I stayed up all night keeping a close eye on the stream. It wasn't until early that next morning that the weather became serious. The water breached the banks of our small stream that was now a raging torrent. It started slamming into the back of our home, and I made the decision to get my 8½-month pregnant wife and my 3-year-old son into the truck, which I had packed with food, water, and just about anything I could think that we would need, and head to Erik's.

At the time, I thought our situation was a unique one because our home was so close to water. I didn't realize the scale of the destruction until I got to the top of our driveway and the roads were completely flooded and trees were blocking the roadways in either direction. We decided to head across the orchard to our neighbor Katie's home until the storm passed. As we walked along the road, I had my son on my back and held my wife's hand as we trudged through knee-deep, fast-moving water that was slamming bits of the crumbling road into our legs.

When we arrived at our neighbor's, she immediately welcomed us in. After making sure everyone was alright, I headed back to our home to retrieve our dogs. When I came back to Katie's house, my wife and Katie frantically told me about a landslide that had just missed Katie's house. I immediately thought about our other neighbor that lived across the street from Katie at the base of the waterfall.

I ran as fast as I could to her house, but I wasn't prepared for what I saw. What had once been a small home at the base of a scenic waterfall was now an enormous debris field. Her home had been struck by the landslide that was funneled directly at her home by the exposed rock of the waterfall. I climbed over the debris screaming her name and was relieved to see her head poke out of a hole in the wall that was once her chimney. I asked if she was OK, and she gave me an emphatic yes. When I reached what was left of her home, I reached out to her and said we have to go. But she refused to leave until she collected some family heirlooms and a bag—once again underestimating the sheer scale of destruction. I suggested that we make our way up to the fire department about a half mile down the road and let them know what was going on. As we walked up the road, I reminded how wrong I was about the size of the storm. There were powerlines all over the road, trees blocking our path pretty much the whole way. When we reached the top of the road, about a quarter mile from our destination, the water was about waist deep and it became impossible to go any further. We decided to turn around and head back to our neighbor Katie's house and wait for the water to recede.

It wasn't until I heard Katie yelling our names that I realized I probably should've gone to Katie's house before we had attempted to go to the fire department. We got back to Katie's house. They were incredibly relieved to see us because they had gone out to make sure that I was OK and found nothing but a destroyed house.

We remained in Katie's house for a while, and I decided to try and come back to our house to grab some more supplies from our kitchen. While I was in our home, my entire house was shaking violently from the water that was still rushing down the mountain. As I stood in the kitchen trying to decide what I should take, our side door, which is attached to our kitchen, blew open and water and mud started flooding in. I braced myself the best I could against the door and was eventually able to shut and lock it again, and I put a stool underneath the doorknob, but the damage had already been done. Our first floor was covered in several inches of mud and water and was soaking into all of the walls and cabinets and appliances.

As I left the house, I walked to the top of the driveway and noticed that in the short time I had been in my home, a landslide at the top of our driveway had crashed down and partially destroyed it. I had only missed it by a few minutes. I returned to Katie's house and waited with Becky, my neighbor, and Katie for the water to recede. I had planned on making our way up to the fire department as soon as I was able.

As I made my way down the road to the fire department, I was absolutely astonished by what I saw. The amount of destruction is something that I hadn't seen since I had served in Afghanistan 13 years prior. There were people wandering around in a state of shock, debris everywhere. The smell of propane was in the air from people's tanks that had been washed down the river, nearly impassable mudslides, piles of trees. Just before I reached the Bearwallow Baptist Church, there was a mudslide in my way. I attempted to cross it, but quickly found myself waist deep in mud, pulling myself up on tree limbs in order to cross it, I finally reached the other side.

When I reached the fire department, I found one of the firefighters sitting out front with a radio, cooking a hotdog over a grill. I was rather shocked when he nonchalantly asked me if I wanted any food. I rather bluntly informed him of what was going on down the road where I lived, and he said, "We're doing the best we can. Everybody we have is out up in the mountains right now." After filling my backpack with as much water and food as I could, I headed back to Katie's house to let everyone know what was going on up the road. I'll never forget their faces when I came back and told them exactly what it was like.

After the water receded, my wife and I made the decision to try and return to our home and clean up as much as we could from the mud that had flooded into our first floor. As we came back, we immediately put our son to bed upstairs as he hadn't slept in a very long time. We tried to keep him on the second floor as much as we could to keep him from seeing what our home now looked like. There was a large pile of debris from a small landslide that had narrowly missed our home, stopping just feet before it smashed into the backside of our house. Our floor was covered with mud, water, and silt, and siding was falling off of our house.

I remembered the firefighter saying that everybody they had was out trying to save people, so I thought I would head back to the fire department and do anything that I could. I was met by Erik's wife Kate and my friend DJ, as they were getting ready to fill backpacks with supplies and head up the mountain and make sure people had food and water. I was given a high-vis Gerton Fire Department vest and told to go up Little Pisgah. One of the other firefighters, who owns a tractor, offered to drive us as far as he could up the mountain in the bucket of the tractor, and we made our way to the top of Little Pisgah to reach cut-off communities and clear debris along the way with this tractor.

When we reached the top of Little Pisgah, we found a group of people who were relatively unaffected by the storm and seemingly well prepared. We left them water and some food and promised to come back the next day. When we reached the fire department after making our way down the mountain, we had a little time to rest and were told about a group on top of Bearwallow Mountain on the opposite side of the gorge who were running low on food and water.

So we started walking up Bearwallow Mountain Road, and when we reached just past the turn to go to Ridge Vista, we made our way into the woods and up a very steep trail. We made our way across creeks that had been completely eroded away and were now 15 to 20 feet deep, where they had been small trickles just a few days before. There were powerlines in this creek. We weren't sure what wires were live, so we did our best to avoid touching the water.

When we got to the home of the people that had requested food and water, we were concerned when nobody answered the door. We radioed back to the fire department to let them know what we found and left all of the food and water that we had on the porch, hoping that they had gone out somewhere and would return to find it.

When we got back down to the fire department, we stayed for a little while, and it was decided that the volunteers should go home. This became a regular, everyday thing for about three or four days. When they ran out of work for the volunteers to do, we were asked to stand at the top of the road at the Eastern Continental Divide heading out of Gerton to stop cars and make sure that the people coming in the now open road were residents of Gerton to prevent looting and people that didn't belong in the gorge from being there.

Being at the fire department, I saw all kinds of volunteers show up with side-by-sides and four-wheelers, truckloads of supplies which everybody in the community helped unload into the fire department, which became a supply hub for the entire community with everything that we could possibly need from baby diapers to toothbrushes.

Not long after the storm, I quickly realized that we were not going anywhere for a while and became very concerned with my wife not being able to get to a hospital to have our baby. Not knowing exactly what I could do, I made arrangements for the fire department to provide medical supplies and talked to our neighbor Katie, who is a midwife, and prepared my family for a home birth. Our baby wasn't due for another 14 days, and I told my wife that if she wanted to leave, I would do everything humanly possible to make sure that we got over the mountain into a hospital. I was very concerned, having been out in the post-storm terrain, that my wife would have difficulty going anywhere in her condition. She agreed, and we decided that the safest option for her would be to rely on our midwife neighbor and the medical equipment offered by the fire department to have a home birth.

One day, when I returned from the fire department to my home, I was greeted by two technical rescue personnel who informed me that a helicopter would be coming in about an hour to evacuate residents to a hospital. I was very concerned that we would end up in a shelter, so I told them that the only way that I am going to subject my wife to crossing this very dangerous terrain would be if they could promise me that we would be airlifted to a hospital. After being given that assurance, I agreed, and in about 30 minutes, we packed up all of our belongings that she would need in the hospital in a bag. Once again, putting my son on my shoulders and having a backpack on, we made our way with the technical rescue workers down to the campground that is next to Grant Mountain Road.

At the time, there was very limited manpower at the Gerton Fire Department, as all of the firefighters were very courageously doing their best to save people, do wellness checks, and clear roads and trails to cut-off communities like Middlefork. My wife and I both agreed that if she could be taken to a hospital, our baby still wasn't due for another few weeks, and her sister would meet her where the helicopter landed. So we made our way to the campground, and I stayed with Becky and my son as they were lifted in a basket into a Blackhawk helicopter and flown to a hospital.

I stayed behind to do what I could or anything that the Gerton Fire Department wanted me to do, and two days later, the roads were cleared enough to where I could drive my truck to go meet my wife at her sister's house in Fuquay-Varina. Three days after my arrival, our daughter was born. About a week after that, we returned to Gerton and stayed at the 3 B's Motel with our friends Brandon and McKenzie, who generously offered us a room to stay in while we organized the rebuilding of our home.

Ann Albright and Gerry Lynam (and Kip and Molly)

Surviving Helene in Bat Cave

It is so easy to take the things in life we count on every day for granted. We hit the switch to turn on the lights. We open the refrigerator and select food that is safe to eat. We get in the shower and there is hot water. We cross our bridge that is the only access to the outside world. One day you suddenly can't do any of those things and more. Hurricane Helene did that to us here in Bat Cave. It washed away our bridge in seconds, damaged our home from falling trees, changed the geography of our land from high-speed flood waters, and denied us basic service. Worst of all it took the life of a neighbor.

Immediately after the storm we looked around to assess the damage. The more we looked around, the more shocked we became. A big landslide caused a multiple-acre pile of mangled trees and mud so high we couldn't see over it or get around it. Trees were sticking out of roofs like darts on a dart board.

Jeffrey Boudreaux

“ My day today:

Woke up at 4:30 a.m. to the sound of my phone vibrating with incoming notifications—the first bit of cell coverage I’ve gotten in twenty-four hours.

Spent two hours frantically trying to answer questions for this Gerton FB group I created, along with the dozens of DMs from frantic family members (including my own), trying to locate their people or seeing if their property still exists.

Slept thirty minutes and woke up to my 7:00 a.m. alarm. Turned on the generator for an hour so I could shower, charge everything, make a protein shake, and get my refrigerator/freezer a chance to keep what’s left of our food from spoiling.

Got dressed at 8:00 a.m.—turned off the generator and checked the propane gauge to see how many days we have left here in paradise (maybe twenty).

Met my fearless/heroic fire rescue friend and neighbor and his badass team leader/chainsaw-wielding wife (also my friend) to start our three-mile hike down our 4,200-foot mountain.

9:00 a.m. Reached the firehouse after walking what looks like a motor cross track followed by several stream crossings, while avoiding collapsing roadways, and hitching a ride for the last half mile on the back of an ATV driven by an ER physician from SC, and son of my neighbor who both drove up just to help (now friends). Attended the daily meeting where we learned who is trapped where, who needs food/water, what temporary bridge needs to be built today.

9:30 a.m. Grabbed some supplies, hitched a ride from my ER-physician friend to the continental divide to take a shift manning a check-point designed to deter looters and other ne’er-do-wells from entering our Armageddon-like world and directed the multitude of selfless, brave volunteers and generous supply and construction equipment drivers where they needed to go.

12:00 p.m. My wife showed up at the checkpoint in a banana yellow Jeep with a 12” lift and 40” super swamper tires, having hitched a ride with a complete stranger who drove up from somewhere else to help us (now a friend). She has done the same hike I did by herself.

12:45 p.m. Emma and I hitched a ride with a friend on the way back from the next town over that’s pretty much as f’ed up as ours.

1:00 p.m. Attended the town meeting where we tell everything we know to everyone that walked down to hear it. Emma gave a talk as our trauma chaplain offering her counseling services in our new PTSD-encrusted world. I ate some barbecue and offered advice as a Katrina survivor on how to navigate FEMA paperwork.

2:00 p.m. Hitched a ride (with friends) back to my sentry post to take another shift as gatekeeper to the town.

4:00 p.m. Hitched a ride with a random car I stopped at the check-point who turns out to be our former state representative.

4:30 p.m. Back to the firehouse. Grabbed some snacks and some food stuffs, unloaded some new supplies that just came in, and tried desperately to catch a side-by-side driver to take us to our road’s gate so we only have to hike one mile… straight up a mountain. We don’t have much energy left.

5:30 p.m. Got home, turned on the generator for three hours so we could shower, and wash clothes, and pretend that everything is like it was before.

8:00 p.m. Met next door neighbors to hike up/down to our other neighbors’ house to eat, tell stories, get drunk, and feel human. Home by 10:00 p.m. Let the dogs out, tucked my wife in, and here I am—answering questions for complete strangers (now friends) and typing this on my “We Are Gerton, NC Facebook group.

What’s my point? We all have a part to play. My day may not look like your day, but both were important. Tomorrow will be completely different. There are people who did a lot more than I did—heroic shit, but I did all I could, and so did they. Strangers become friends, and communities come together under extreme pressure. I love this place. I love these people. This is my home, and I will do my part to make it right. God bless us all.”

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balance through proper planning