



Andrews to Murphy (A2M) Rail Reactivation Study

PROJECT SUMMARY

NCDOT Rail Division
November 2014

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Prepared by:



“Good ideas are common—what’s uncommon are people who’ll work hard enough to bring them about.” – *Ashleigh Brilliant*

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Acknowledgements

Thank you to all of the organizations and individuals who committed their time, energy and resources to this effort. This market feasibility study would not have been possible without the support of many throughout the process.

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Executive Summary

Following the discontinuation of freight traffic on the line, the State of North Carolina purchased the stretch of track between Dillsboro and Murphy to forestall the destruction of the track.

The Andrews to Murphy rail line, once an integral and active freight and passenger rail corridor, was closed to freight traffic in 1985, following years of declining use and profitability. Passenger service was discontinued almost 40 years prior to that date, in 1948, as Americans increasingly moved towards the automobile as the primary form of transportation. With the rail line lying substantially inactive for decades, many regional leaders feel the rail line is an untapped resource. “We must rethink the way this vital asset can be reused or reinstated”, states Mayor Bill Hughes. As a response, NCDOT Rail Division commissioned this study with the purpose of assessing the **marketing potential, technical requirements, and return on investment** of reactivating the existing rail line from Andrews to Murphy.

HISTORY

Originally constructed in the 1880s, the Murphy Branch proved to be a popular passenger line, particularly around the turn of the 19th century. Four trains ran from Asheville to Murphy each day during this time period. While passenger rail between Asheville and Murphy became less attractive to travelers over the course of the early 20th century, freight traffic peaked in the 1940s around the construction of the Fontana Dam, which was supplied by regular freight shipments on this. Production of copper ore from mines in western North Carolina and Tennessee increased the supply of tonnage shipped. As the trucking industry grew and became more competitive and cost-effective, the freight rail service became unprofitable. Following the discontinuation of freight traffic on the line, the State of North Carolina purchased the stretch of track between Dillsboro and Murphy to forestall the destruction of the track.

PROJECT NEED

The 2008 recession hit western North Carolina particularly hard, negatively impacting key industries in the region. As industries closed or relocated, supporting businesses, such as retail, commercial, and entertainment companies, also experienced reduced returns, though tourism remains a strong contributor to the local economy. Rail service to the region has the potential to further enhance the tourism industry, but also provides the opportunity to cost-effectively ship raw materials and finished products to end markets in North Carolina and beyond. The intent of this study is to evaluate the feasibility of reopening the rail line and includes technical studies of infrastructure needs, including the track, bridges, and supporting facilities; projections for costs and repairs; operational considerations; economic

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forecasts, including a market assessment, economic development potential, and funding sources; and an examination of the return on investment (ROI).

KEY STAKEHOLDERS

A variety of stakeholders are invested in this project, including local and regional governments, regional industries, tourism businesses, the Great Smoky Mountains Railroad, the Blue Ridge Southern Railroad (BLU), Cherokee Nation, the Western Carolina Regional Airport, the Appalachian Regional Commission (ARC), and many others. This project has a potential to have a profound impact on the region and will require the support of these and many other important stakeholders.

RAIL EVALUATION PROCESS

In order to evaluate the potential and viability of tourism, passenger, and/or freight rail on the Andrews to Murphy line, decision-makers and stakeholders examined not only objective measures, such as an economic development analysis, a market assessment, and detailed engineering site/infrastructure repair and cost projections, but also more subjective input, such as stakeholder interviews and comparative case studies. The rail line analysis used the NCDOT-adopted TREDIS (Transportation Economic Development Impact System) model to better understand the freight

The economic analysis indicates the addition of nearly 1900 jobs and \$60 million additional wages, providing a substantial boost to the economic vitality of Cherokee County.

and ancillary development impacts. Public engagement was facilitated through one-on-one stakeholder interviews, a public symposium, and focus group discussions.

REGION CONTEXT & SITE DESCRIPTION

The rail line is still in relatively good condition. The track itself consists of lighter rail sections on timber crossties, while the bridges along the track are mostly timber trestles with two steel bridges over the Valley River. All of the bridges are in need of some repair, while culverts and roadway crossings are in need of an upgrade to support rail transportation at the current standard.

The rail line sits on an easement reserved for railroad purposes. In some cases, homes, businesses, and roadways may encroach on the area reserved for safe railroad operation (25' horizontal clearance). Access to the A2M section is via the BLU and GSMR railroads from Asheville. These rail lines traverse rugged terrain which presents challenges to modern freight services. Tunnels and structures limit freight capacity. These challenges can often be mitigated by carefully managing railroad operations to avoid costly improvements. Depending on service requirements, rehabilitation and upgrades to tunnels and bridges may be necessary to accommodate modern full size (and weight) freight cars.

METHODOLOGY/MINIMUM RAIL LINE INFRASTRUCTURE NEEDS

The Stantec team performed field reviews on three occasions, which included a preliminary observational review and two more detailed site inspections. This analysis provided site-specific recommendations for track, bridge, crossing and culvert repairs and improvements. In addition to these field reviews, Stantec specialists evaluated the railroad operating capacity, conducted stakeholder interviews, and performed economic modeling using the TREDIS model. These analyses revealed a number of important considerations regarding both site and track improvements as well as economic viability.

Stantec has identified \$10.3 million of repairs to the A2M rail line will be necessary to reconstitute freight, passenger, and/or tourism rail service. To enhance crossing safety and railroad operations, \$3.9 million of upgrades may be considered. GSMR has estimated \$4.4 million of repairs to their rail line to provide access to the A2M corridor (maximum 50% State contribution). Including project design and incidentals, **the total project cost is estimated to be \$17.4 million**. In addition, approximately \$5 million of repairs and upgrades to local infrastructure in Andrews and Murphy is recommended to accommodate tourists using the rail service – anticipated to be addressed by others.

MARKET POTENTIAL AND INVESTMENT VIABILITY

Stakeholder interviews, comparative case studies, and economic modeling formed an important component of the analyses performed. Results of the stakeholder interviews were generally positive, while the comparative case studies yielded important lessons for making the service economically viable and supplied important information about how similar rail reactivations achieved economic sustainability. The analysis of

the return on investment from the reactivation indicated that the service would provide a substantial boost to the economic vitality of Cherokee County.

ENVIRONMENTAL SCREENING

Environmental resources along the rail corridor, including streams, wetlands, protected floodplains, and protected species, as well as details of the possible direct impacts to these resources, were evaluated at a desk-top level. Additionally, this section provides information on the “human environment” elements surrounding the rail corridor, such as historic structures, farmlands, and schools. A preliminary assessment was conducted to identify sensitive natural and human environment areas in close proximity to the rail line. Field investigations including additional data-gathering and detailed analysis would be required in subsequent design phases.

RECOMMENDATIONS AND CONCLUSIONS

The findings contained in this report indicate that reactivating the Andrews to Murphy rail line to provide freight and tourism rail service would provide an economic boost to Cherokee County and should be considered along with other rail priorities in North Carolina. In fact, the results of this detailed economic analysis indicate a boost to the regional economy of approximately \$60 million and the addition of nearly 1900 jobs over the next 15 years. ***This will provide a wage related Benefit-Cost Ratio of greater than 3:1.*** Benefits included the potential for new industry and the subsequent creation of jobs and associated tax/income benefits as well as the cost-saving (value of time) of bulk freight.

This report provides clear support for reactivating the Murphy to Andrews rail line. Decision-makers, both public and private can use the findings of this study to support the reactivation of this important rail asset.

The findings contained in this report indicate that reactivating the Andrews to Murphy rail line to provide freight and tourism rail service would provide an economic boost to Cherokee County.

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The intent of this section is to describe the project need and geographical relationship relative to the surrounding area and historical content. NCDOT has commissioned the study to administer an objective view based on empirical data as well as key stakeholder insight and ultimately, to determine the viability of rail reactivation.

01 History & Need

HISTORICAL CONTEXT

From bustling service—to closure—to rebirth of a rail line

The rail line to Murphy was originally constructed in the 1880's as part of the Western North Carolina Railroad known as the Murphy Branch. An excellent historical account by the Great Smoky Mountains Railroad (GSMR) service is presented below:

The Murphy Branch of the Western North Carolina Railroad delivered thousands of mountaineers from the wilderness of their landlocked hills. A year after iron rails reached Asheville in 1880, workers scattered to the west of the city, digging, filling, and blasting an extension of the line that stretched 116 miles to Murphy, providing thousands with a path to reach the outside world.

The iron horse beat riding a wagon, but in many ways the young railroad was still primitive. In 1892, a visitor from Chicago described it as "little more than two streaks of rust and a right-of-way." With tongue in cheek, he told the Chicago Tribune, "when the wind is just right, the fastest train on the line, the 'Asheville Cannon Ball,' can make 10 miles an hour."



Courtesy of Great Smoky Mountains Railroad



Courtesy of Great Smoky Mountains Railroad



Courtesy of Great Smoky Mountains Railroad

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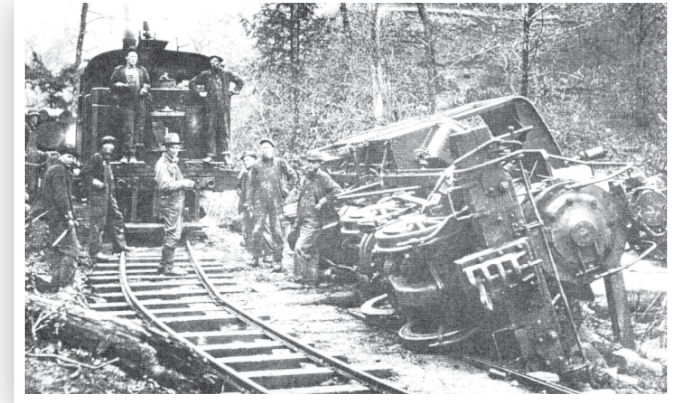
...there were
a number
of runaways
on Balsam
Mountain
and a couple
of wrecks
inside Cowee
Tunnel and in
the river...



Courtesy of Great Smoky Mountains Railroad

Rails changed the way of life for Western North Carolina residents. Mercantile business was commodities for a few of the bare necessities. Conveniences and luxuries were not even dreamed of and cash was hard to come by. The iron rails brought a flood of salesmen who peddled oil lamps that superseded tallow candles and New England "factory cloth" to replace scratchy, uncomfortable homespun. From door to door they sold books, pump organs, enlarged pictures, jewelry, lightning rods, baubles and doodads.

Passenger business was so good by the turn of the 20th century that six passenger trains ran every day between Asheville and Lake Junaluska and four daily between Asheville and Murphy. It was not easy to cut this branch line through the mountains. If it had not been for the practical, self-educated engineer Capt. J. W. Wilson, a rigidly honest and industrious man, it might not have been accomplished for years. One of Capt. Wilson's



Courtesy of Great Smoky Mountains Railroad

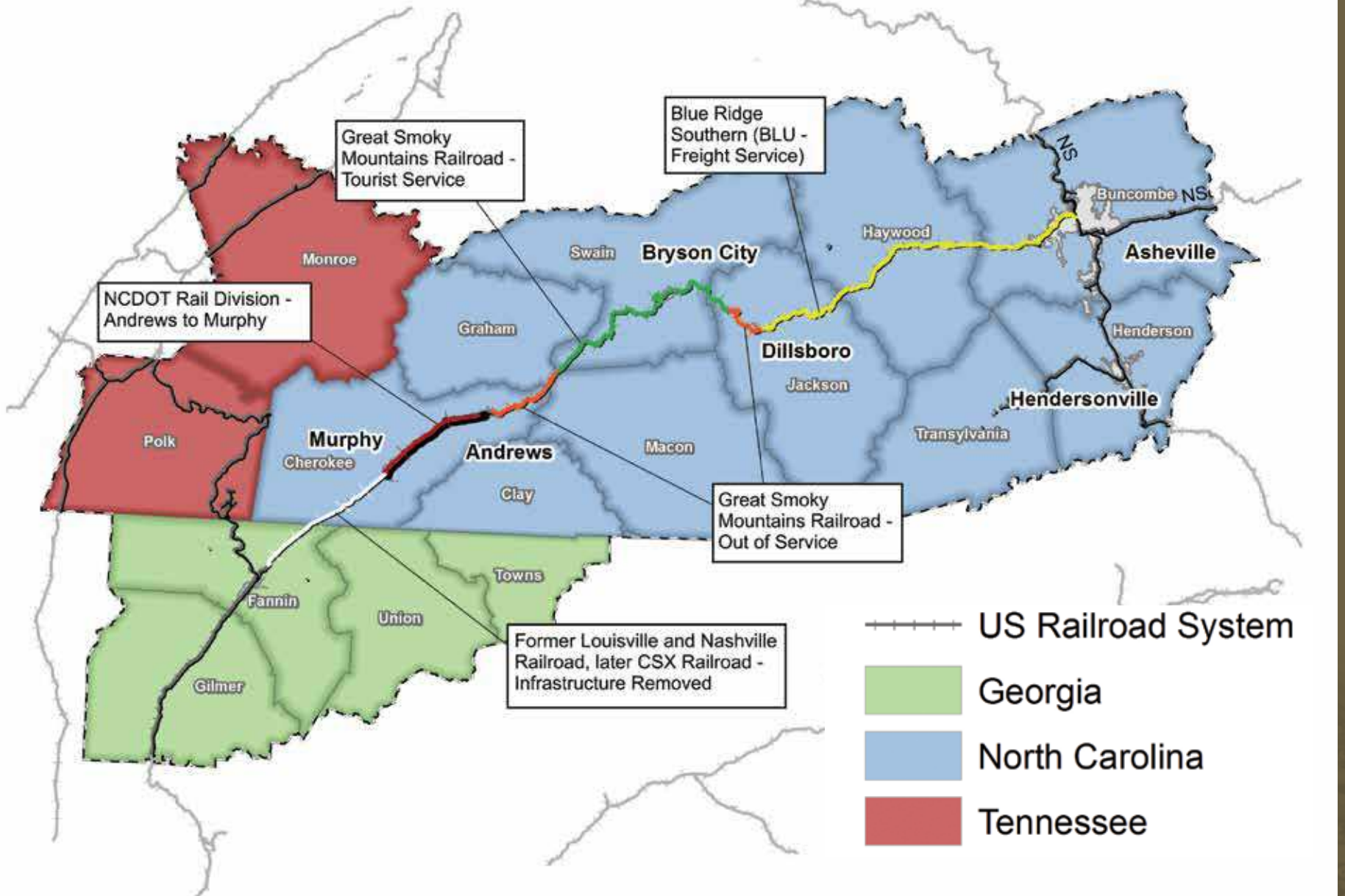
most challenging tasks was the grade on the west side of the Balsams that was steep and curvy, with gaping ravines. His second obstacle was the 836-foot Cowee Tunnel through a shaky mountain west of Dillsboro. High iron topped the Balsam Mountains at 3,100 feet, at the time the highest elevation of any railroad in the Eastern United States.

In the early years of the 20th century, there were a number of runaways on Balsam Mountain and a couple of wrecks inside Cowee Tunnel and in the river, but loss of life was small. As improvements were made to the railroad, accidents declined.

The Murphy Branch experienced its heaviest use during wartime, in the early 1940s when the massive Fontana Dam was constructed. Thousands of carloads of cement, equipment, and other materials reached the construction site by rail on a spur line built from Bushnell to Fontana. Huge shipments of

Figure 1.1

Murphy Branch



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copper ore from mines in the western end of North Carolina and Copperhill, Tennessee, increased the line's tonnage. In the 1920s, ribbons of concrete roadways crawled through the mountains, linking towns together.

With the increasing popularity of the automobile, passenger traffic on the Murphy Branch, then owned by the sprawling Southern Railway System, began to decline. Southern discontinued all passenger traffic on the Murphy Branch on July 16th, 1948, ending 64 years of service that had opened Western North Carolina to the outside world. When freight traffic dropped off by 1985, Norfolk Southern closed the Andrews to Murphy leg of the Murphy Branch and the State of North Carolina purchased the Dillsboro to Murphy tracks to keep them from being destroyed.



By 1988, many entities had come together to form the Great Smoky Mountains Railway, which then began running excursions. Rolling stock for the GSMR was purchased from various railroads around the nation. The Dillsboro to Nantahala route was one of the most scenic on the Murphy Branch and the excursion trains caught on right away. Upward of 200,000 passengers enjoy the scenery each year aboard the excursion trains. American Heritage Railways purchased the GSMR in December of 1999. The Great Smoky Mountains Railway operates today as the newly organized Great Smoky Mountains Railroad.¹

GSMR initially leased the track from NCDOT Rail Division and operated the entire corridor from Dillsboro to Murphy. The Dillsboro to Andrews section was subsequently sold to GSMR and the Rail Division retained ownership of the Andrews to Murphy section. Ongoing maintenance activities by the Rail Division have kept this section of the corridor intact and preserved.

In the decades since the rail line was removed from service there has been considerable interest in restoring operations. The intent of this study is to understand how the rail corridor could be a key component of the overall transportation system within the region and beyond.

¹Source: Great Smoky Mountains Railroad website:
<http://www.gsmr.com/explore/about-railroad-history/western-nc>

PROJECT NEED

The rural areas of western North Carolina have been especially impacted by the recession.

While tourism has remained strong, a number of industries have closed or relocated in recent decades. These industries were key employers, attracting somewhat higher salaries. So, the loss of industry has a profound impact on regional income levels. The loss is also felt in supporting businesses such as retail, commercial, and entertainment.

Transportation of goods into and out of the area is a critical component of maintaining and attracting industries. For many, rail provides the best or only cost effective means to receive raw materials and to ship finished products. Simply put, many industries (such as those that ship bulk materials) will not consider the area for business development without rail service connected to the national network.

Tourism is another key component of the regional economy. Area activities and attractions including rafting, hiking, zip-lining, bicycling and camping - attract tens of thousands of annual tourists and are vital to the local and regional economy. The GSMR successfully operates tourist trains out of Bryson City as does the Blue Ridge Scenic Railway in northeast Georgia. In fact, GSMR has expressed an interest in expanding its tourism services to Cherokee County utilizing this segment of rail line.

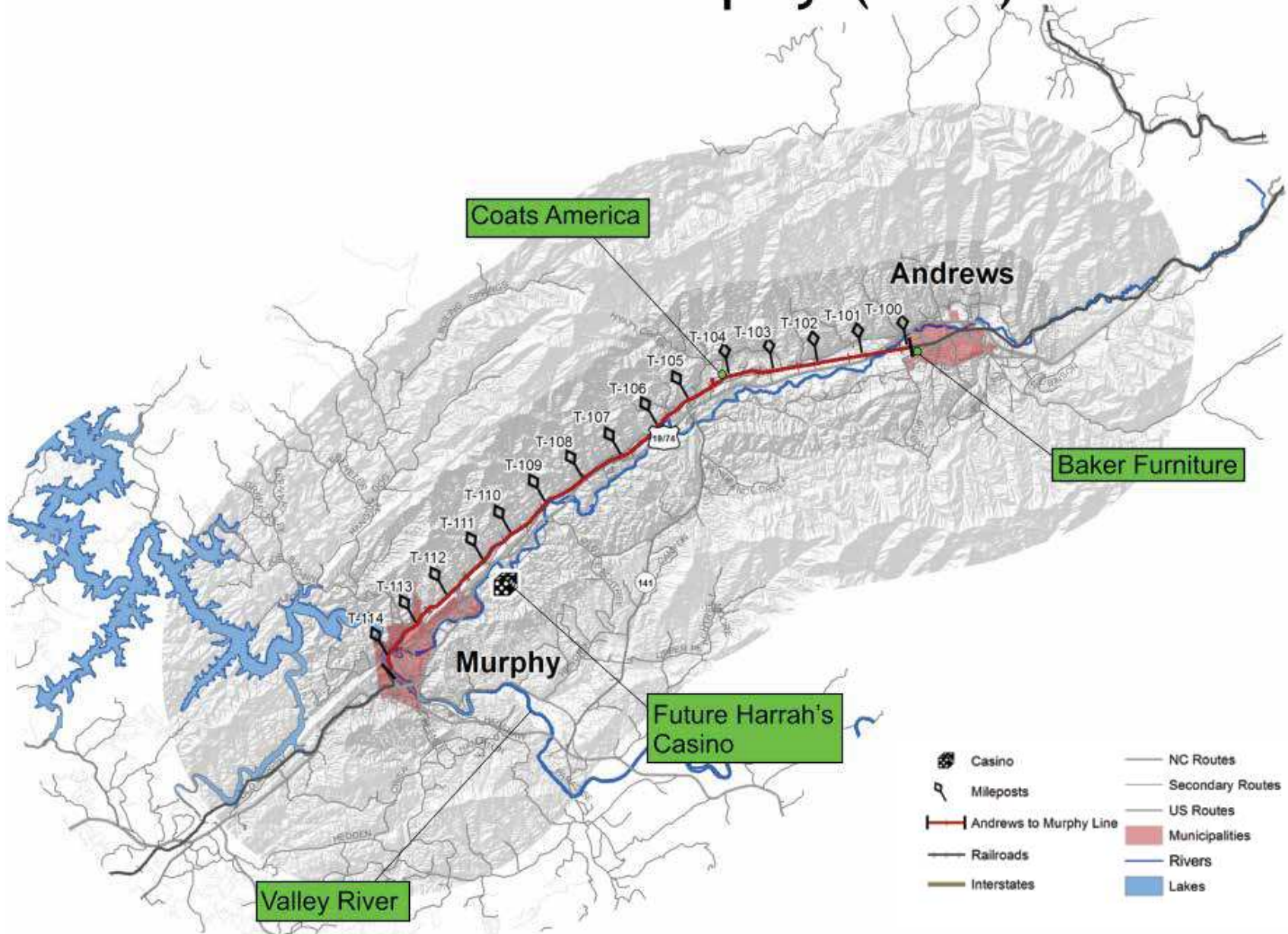
NCDOT Rail Division retained ownership of the Andrews to Murphy Section of the Murphy Branch with the intent of preserving and possibly restoring the rail corridor. This section is fortunate to be on relatively level terrain and is free of excessive curvature (other than a few locations near Murphy). The Rail Division has provided necessary oversight to maintain the corridor and provide the opportunity for reactivation.

The intent of this study is to provide an independent evaluation of the feasibility of reconstituting the rail line. It includes a technical evaluation of the infrastructure and facilities needs, opinion of repairs and costs, railroad operating characteristics, market assessment, usage forecast, potential to influence economic development, investment viability, funding sources, and return on investment (ROI).



Figure 1.2

Andrews to Murphy (A2M)



KEY STAKEHOLDERS

Although there are a multitude of stakeholders who have varied interest in the status of the rail line, a few of the more active stakeholders include:

- » Town of Murphy
- » Town of Andrews
- » Cherokee County
- » Local and Regional Governments State Transportation Agencies
- » Local/Regional Industries
- » Local/Regional Departments of Commerce
- » Local/Regional Commercial and Retail Businesses
- » Local/Regional Tourism
- » Great Smoky Mountains Railroad (GSMR)
- » Blue Ridge Southern Railroad (BLU)
- » Cherokee Nation
- » Adjacent Property Owners
- » Western Carolina Regional Airport
- » Appalachian Regional Commission (ARC)
- » AdvantageWest

In short, the decisions made on reactivation of the A2M rail line will have a profound impact on a broad range of constituents now and for decades to come.



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02 Study Objectives & Assumptions



EVALUATION

The intent of this study is to provide an objective evaluation of reactivating rail services (tourism, passenger and/or freight) to the currently inactive rail line from Andrews to Murphy, NC.

With this in mind, several tools, both analytical and subjective, were used to evaluate the feasibility of services, including a Market Assessment and Economic Development Analysis, Stakeholder Interviews, Comparative Case Studies and detailed assessment of engineering site/infrastructure repair and costs. No single factor was used to make determinations. Rather, it was combined assessment, balanced with engineering judgment used to determine the outcome and recommendations of this feasibility study.



ECONOMIC BENEFITS AND RETURN ON INVESTMENT (ROI)

Part of this study includes an analysis of the economic benefits and return on investment (ROI) of reactivating rail service. TREDIS (Transportation Economic Development Impact System) is modeling software used and endorsed by NCDOT to help analyze both freight and potential development impacts from proposed rail reactivation. Using TREDIS, a benefit-cost value was developed and compared back to the “Do Nothing” scenario to arrive at a ROI value. See chapter **07 Environmental/Cultural Assessment** for more details. This analysis provides decision-makers with yet another tool to determine if reactivating the rail line is feasible.



OUTREACH & GUIDING PRINCIPLES

The development of a successful, coordinated strategy required the participation of multiple agencies, and representatives from each of the area's jurisdictions, regional transportation agencies as well as input from the public. A comprehensive outreach strategy was used to ensure adequate participation occurred and that the project team received competing viewpoints on the advantages and disadvantages of rail line reactivation. The strategy included a series of active outreach methods used throughout the process. These methods included stakeholder interviews, surveys, public information sessions, discussion groups and a project symposium. A brief description of these events is provided below.

Regional Focus Group Discussions— February 25, 2014

As part of the Opportunity Initiative (OPT IN)/Cherokee County Tomorrow Plan¹ regional leaders hosted a multi-day Summit to effectively engage regional leaders as well as the public on growth and transportation issues. Part of this effort included facilitated group discussions, one of which focused on transportation infrastructure and the reactivation of the Andrews to Murphy rail line.

¹Opportunity Initiative (OPT IN) sponsored by the Southwest Commission and the Appalachian Regional Commission, to develop a comprehensive development plan for the seven westernmost counties in North Carolina. This event was a joint conference including Cherokee County Tomorrow Plan to focus on issues specific to Cherokee County.

Public Symposium—March 31, 2014

This Leadership/Public Symposium was the second installment of stakeholder outreach and provided an opportunity to integrate the thoughts and opinions of stakeholders into the planning process. During the symposium, attendees were able to participate in real-time push button voting, which was used to examine individual preferences weighed against those of the group. Input gathered at the symposium was used to develop guiding principles and identify trade-offs that needed to be addressed as a part of the analysis of the study.

Stakeholder Interviews—Spring 2014

To effectively engage decision-makers and transportation leadership within the region, the project team facilitated one-on-one stakeholder interviews. As a part of this exercise, we prepared and administered a survey and interactive mapping exercise to challenge participants to consider the positive and negative (competing interest) impacts related to reactivation of the rail line. The results of these interviews are described in chapter **07 Environmental/Cultural Assessment**.

News Media Coverage—Ongoing

Several media related activities were conducted throughout the planning process. These activities included newspaper articles, web-based announcements and interviews with published and live media. This coverage helped to “get the word” out on study objectives as well as for events and activities.

It is estimated that the overall public outreach included over 400 participants.



Courtesy of WKRC Radio, Murphy NC. www.1320am.com

March 31, 2014



Facilitated “Push Button” technology was used by participants to highlight issues and concerns with the potential for rail reactivation. The results highlighted a renewed interest in rail services for the region as well as competing interest. Ultimately, this interactive exercise helped folks gain a better understanding of the preferred outcome for the study.

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03 Region Context & Site Description



The Murphy branch runs through the rugged terrain of the Smoky Mountains in western North Carolina. At its inception, steep grades, tunnels, and sharp curves were accepted practice to control construction cost. Grades exceed four percent in several areas, well over the current standard railroad practice of less than 1 (optimal) to 2 percent (maximum). Tunnels were utilized in two locations on the GSMR section of the Murphy Branch to avoid excessive excavation of mountain landscapes and site lines.

CURRENT CONDITION

The rail line is in fair condition considering it has been out of service for several decades.



Four back to back curves of approximately 12 degrees are not desirable in their current state, but can accommodate the desired operating speed (up to 25 mph) with proper super elevation of the track per Federal Railroad Administration (FRA) standards. This is consistent with railroad operating practices for light density lines in rugged terrain. Note - there is little opportunity to mitigate the curves without significant impact to surrounding environment.

The A2M section has been in various stages of use for the past several decades. The track consists of a lighter rail section (85 lb. per yard) on timber cross-ties. Bridges are primarily timber trestles with some steel members. There is a steel deck plate girder (DPG) bridge over Valley River near Andrews and a steel Pratt truss bridge (pin connected) over the Valley River in Murphy. The alignment is generally good with no steep grades and only a few sharp curves! near Murphy.

Based on engineering field observations, all of the bridges are in need of repair and/or replacement to accommodate safe railroad operations. Culverts are in good condition with some noted obstructions and minor damage repair needed. In addition, there are many roadway crossings on the corridor. All crossings will require resurfacing and repair of traffic control/warning devices. In subsequent phases, the NCDOT Rail Division, Engineering Safety Group will complete a detailed evaluation of the crossings and provide recommendations for improvements to warning devices (i.e. installation of additional flashers and /or gates), as well as closures and consolidations.



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RAILROAD EASEMENT/RIGHT- OF-WAY (ROW)

According to historic records, the rail line occupies an easement for railroad purposes. In short, the property is not literally owned by NCDOT, but rather occupied similar to a utility easement.



The owner of the railroad has the right to utilize the property as necessary for “safe and efficient operation of the railroad services”. The easement is typically two-hundred (200) feet in width and gives the owner the legal right to enforce reasonable clearances and to expand when needed to meet needs. It does not give the owner the right to occupy the entire 200 foot corridor for purposes other than railroad transportation use.

There are many instances where homes, businesses and roadways are located within the railroad easement. There are a few instances where homes, businesses and roadways encroach on the zone required for safe and efficient operation of the railroad services. Stantec recommends a typical clearance of at least twenty-five (25) feet be established as limit for encroachments of concern.

CONSTRAINTS

The most significant constraints to reconstituting the rail line are gaining access to the corridor via steep grades, tunnels (on GSMR) and bridge repairs on the rail line.

In order to totally mitigate the steep grades, it would require rerouting of the corridor or construction of additional tunnels. Both options would involve considerable cost and significant environmental impacts and are not considered to be practical alternatives. It is recommended that these challenges continue to be managed with careful consideration of railroad operating procedures and power (locomotive) requirements.

The tunnels on the GSMR do not provide adequate clearances on the top and sides for today's taller, wider and longer freight rail cars. The tunnels provide approximately 18 ft. of vertical clearance. Guidelines in the American Railway Engineering and

Maintenance-of-Way Association (AREMA) Manual for Railway Engineering recommend horizontal and vertical clearances of 9 ft. and 23 ft., respectively. There are no regulations covering clearances specific to North Carolina. While it may be impractical to expand the tunnels to meet full AREMA guidelines, some expansion is warranted to accommodate larger cars that would be anticipated for typical industrial railroad services.

Bridges on the Murphy Branch are not structurally sound enough to carry typical railroad loading (max. 286,000 lbs.). Due to steel truss members, several locations do not provide an adequate clearance envelope for modern railcars. Specific issues and mitigation recommendations are discussed in subsequent sections.



REGIONAL CONTEXT (I.E., RAIL SERVICE OUTSIDE OF STUDY AREA)

GSMR—OPERATION, CONDITION The GSMR owns 53.1 miles of the Murphy Branch from east of Dillsboro (MP 47.0) to the south (west) side of Andrews (MP 100.1). See **Figure 1.1** on page 13. Currently, this section is used as a tourist railroad with operation occurring from the east side of Dillsboro to the Nantahala Outdoor Center (NOC). Tourist trains operate on a regularly scheduled basis with some special trains operating to meet seasonal demands or events. Freight operations have been provided in the past, but were discontinued in 2006 due to low volume and challenges providing cost-effective service. Based on stakeholder interviews, GSMR may be interested in resuming freight operations if the market conditions are favorable.

The GSMR railroad is of similar vintage to the A2M section, however, it is an active rail service and has been better maintained in recent years. Continuous operation exposes flaws and demands repair of ineffective items such as ties, rail and drainage structures. Bridges, and tunnels in the Topton area (MP 87 – 100.1) are items of particular concern on this section of the Murphy Branch.

The GSMR includes 26 bridges and major culverts that are in various states of repair. All are stated to be in acceptable condition for railroad operations. However, loading capacity is limited to 265,000 lb. rail cars; most bridges will require upgrades to safely handle a fully loaded freight railcar (286,000 pounds). In addition, vertical clearance is limited to 18 ft. at the two steel truss bridges; Bryson City (MP 64.90) and Fontana Lake (MP 74.90).

Clearance restrictions are also encountered at the two tunnels on the GSMR. The 836 foot Cowee Tunnel at MP 49.25 and the 335 foot Rhodo Tunnel at MP 94.90 are in need of expansion to meet current industry standards.

Finally, the Topton section of the GSMR ascends the mountains to the west of the NOC as the rail line approaches Andrews. Railroad grades average 4 percent for a 3-½ mile section and approach 7 percent in isolated areas. This is far greater than the 1 to 2 percent maximum generally utilized by most railroads.

The Topton section of the GSMR has been out of service for some time and similar to the A2M corridor has fallen into a state of disrepair. ***GSMR has estimated a cost of approximately \$4.4 million to repair this area to allow safe railroad operations.***

NOTE: The GSMR is located immediately east of the A2M section and any freight moving into or out of Cherokee County must pass through the GSMR.

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BLU—OPERATION, CONDITION The eastern section of the Murphy Branch, from Asheville (MP 0) to east of Dillsboro (MP 47.0) is currently owned and operated by Blue Ridge Southern Railroad (BLU), a subsidiary of WATCO, a shortline operator based in Pittsburg, Kansas. BLU operates the rail line on a daily basis to serve freight customers. Though it was constructed in the same timeframe as the other sections discussed above, it is in better condition as it has been operated and maintained on a consistent basis by a Class I railroad. The terrain is similar to the other sections, consisting of steep grades and sharp curves. The grades near Balsam are of particular concern and include approximately four miles of track varying between 3.5 and 4.3 percent. There are no tunnels on this section.

MURPHY TO BLUE RIDGE, GA The Louisville and Nashville (L&N) railroad was constructed as an extension from Murphy to Blue Ridge, Georgia connecting with a mainline track. L&N was acquired by CSX and this corridor was removed from service in 1986. The tracks were removed and the right-of-way has reverted to surrounding property owners.

There has been discussion from some local stakeholders to reconstituting this section of rail line in conjunction with the A2M section. A desktop analysis of the corridor was completed to provide an opinion of feasibility. To reconstruct this rail line would be akin to starting from scratch on a new rail corridor and require complete National Environmental Policy Act (NEPA) Environmental permitting, repurchasing the right-of-way and reconstruction of the track and bridges. This could easily amount to an order-of-magnitude cost in the hundreds of millions of dollars.

RAILROAD SERVICES

For the purposes of this study, railroad services have been divided into three main categories: TOURISM, FREIGHT and PASSENGER. For clarification, passenger service is further divided into regional and local passenger service.

TOURISM RAIL SERVICE

Includes recreational trips for entertainment purposes similar to that provided nearby by GSMR and Blue Ridge Scenic Railway. This is a major consideration for this study.

FREIGHT RAIL SERVICE

Includes movement of bulk commodities to industries, manufacturing sites, bulk material producers and large retailers, to name a few. This is a major consideration for this study.

PASSENGER RAIL SERVICE

Regional Passenger Rail Service

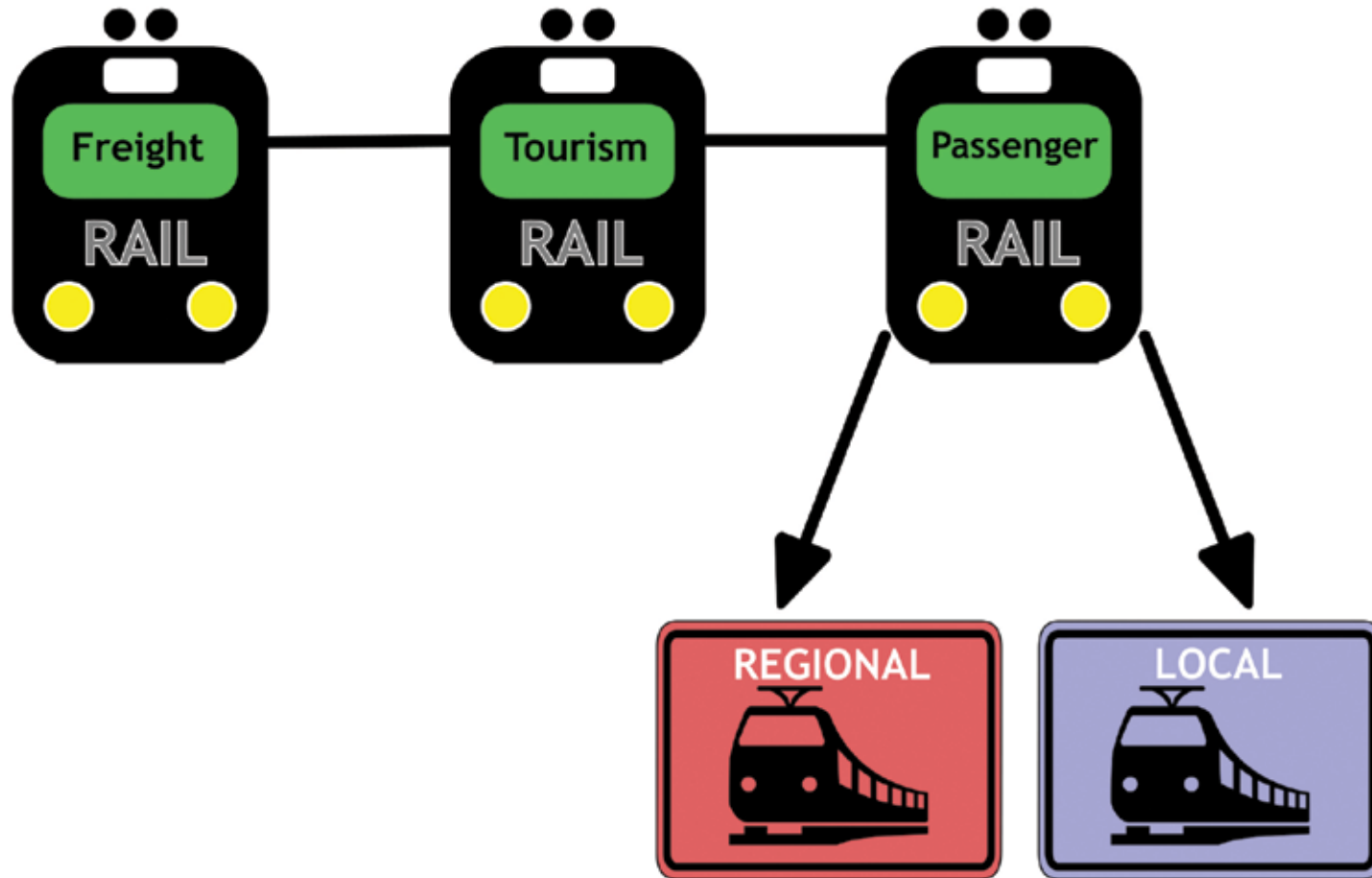
Regularly scheduled passenger service to and from major metropolitan areas with regional stops along the way, similar to Amtrak. Due to the rugged terrain and lack of through service (removed connection to Blue Ridge, GA); this is not considered a viable service for this rail line and is not considered further in this study.

Local Passenger Rail Service

Limited service with single unit passenger cars to provide local mobility between local communities or points of interest, such as Nantahala Outdoor Center, or between casinos. This service does present significant challenges to implement and there has been enough local interest to warrant consideration in this study.



Rail Service Options



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04 Methodology & Data



SITE INSPECTION

Stantec professionals experienced in railroad design, construction, operations and maintenance inspected the A2M section of the rail line on several occasions throughout the planning process.

The planning process included a desktop evaluation using online mapping and aerial photography as well as track charts, timetables and evaluation maps. This exercise provided an overview of the general history, site conditions, and operating characteristics as well as areas of focus during upcoming field inspection.

A field review and observation was completed in February, 2014. This was completed by hi-rail to allow direct access and provided the inspection team with a better understanding of site conditions. Data gathered on this trip provided the basis for developing a plan for a more detailed inspection of the rail line.



This third component of the site inspection included a more detailed inspection of the rail line, was conducted on April 1-3 and May 6-7, 2014. During these inspections the team made detailed observations, measurements and evaluations of specific infrastructure and components of the railroad including: track embankment, ties, rail, bridges, culverts, crossings, turnouts, trackside ditches and signage. The data gathered was used to evaluate deficiencies and develop recommended repairs, improvements and subsequent cost estimates.



RAILROAD OPERATIONS

A Stantec professional experienced in planning and modeling railroad operations completed an analysis of the conditions and constraints to provide a detailed evaluation of the practical railroad operating capacity. Train Performance Calculations (TPC) were undertaken on the ruling grade in both directions to determine the maximum number of cars which could be reliably hauled. See chapter **05 Rail Line Infrastructure Needs** for detailed analysis.



ECONOMIC/MARKET DEVELOPMENT

The assessment of the economic impacts for this study was comprised of three separate but inter-related efforts including **Stakeholder Interviews, Comparative Case Studies and Economic Modeling**, all described in more detail in chapter **06 Evaluate Market Need & Investment Viability**.



The methodology and data used to develop the economic development potential and return on investment for evaluating the reactivation of the rail line service primarily relied on off-the-shelf data, field measures, IMPLAN data (private on-line database that provides economic analysis data and tools) as well as stakeholder insight. Both qualitative and quantitative analytic measures were used in this study, in part to ensure that the local insights of people highly familiar with the economic development potential could participate in the study.

Our project team economists utilized the NCDOT-approved economic model TREDIS,™ a computer model that relies on input-output economic analysis to describe the impacts from various transportation infrastructure or service improvements. IMPLAN data was used as input values to the TREDIS model to assess the economic impacts of reactivating the Andrews to Murphy rail line assuming three different rail services.

- » Local passenger rail
- » Freight rail
- » Tourism passenger rail

IMPLAN data was used to examine how changes in programs and policies may impact local economies and how current industries are supporting the U.S. economy. As IMPLAN tracks the tax collections associated with projects and employee spending, IMPLAN can also aid in estimating revenues associated with various projects.

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05 Rail Line Infrastructure Needs



OBJECTIVES AND ASSUMPTIONS

If rail service is to be reestablished, it is expected that the service match the historic railroad operations at a minimum.

The railroad has operated as a low speed (FRA Class 1 or Class 2) secondary line, typically less than 20 mph and often limited to 10 mph. The objective of this assessment is to provide an analysis of the current rail line condition, evaluate necessary repairs to achieve minimum service and determine practical enhancements to safety, operations or service. This assessment will be based on establishing FRA Class 2 services where possible and to identify areas where speed will be restricted to Class 1 standards. See table below:

Table 5.1

FRA TRACK CLASS	MAXIMUM OPERATING SPEED	
	FREIGHT	PASSENGER (TOURISM)
1	10	15
2	25	30

Source: FRA

Safety is the number one concern in all aspects of railroading. This includes design, construction, operation and maintenance activities. The evaluation team has paid particular attention to safety in all evaluation and analysis activities.

It may be desirable to upgrade the rail line and operate the railroad at FRA Class 2 speeds (30 mph passenger and 25 mph freight). This goal is easily attainable in the northern section of the corridor (Andrews extending about nine miles south). However, it is more of a challenge to do so approaching Murphy due to sharp curves, more roadway crossings, higher embankments and more existing development. Further, there appears to be less need to maintain higher speed as more industrial development potential exists to the north. It is recommended that Class 2 service be established north of MP 109 and Class 1 to the south. If the need arises, the southern track can be upgraded to meet railroad service requirements.

STRUCTURE CONDITIONS

The project team performed inspections of ten railroad bridges between Andrews and Murphy as well as cursory inspections of two overhead roadway bridges.

BRIDGE INSPECTIONS

The railroad bridge inspections were non-destructive, annual cursory inspections of the timber and steel structures. With this type of annual review, inspectors get within arm's length of each member and inspect for any deterioration that could cause a structure to fail. Another component in these inspections included an evaluation of significant structural changes that may have occurred to the railroad bridges since previous inspections and subsequent ratings.

FINDINGS

BRIDGES (MINOR) The majority of bridges along the subject corridor are constructed of timber (some include steel members) and are in fair condition for running trains. Most require some attention (most visibly the bridge tie deck replacement) to achieve the minimal structural requirements to run frequent passenger and freight traffic across them safely. It should be noted that some smaller timber bridges have been fitted with steel beam spans. Other areas where the bridge structures need repairs include:

- » Replacing timber piles (known as posting a pile);
- » Replacing timber caps with concrete caps (on which the superstructure or span rests);
- » Replacing a few stringers (which combined together form the span);
- » Replacing mud sills or blocking (timber components resting on the ground supporting timber posts or bents) and
- » At select locations replacing all the timber components (known as framing a bent).

Based on professional engineering judgment and field inspection data, all of the minor timber bridges can be repaired to ensure safe passage for rail traffic. It is recommended that the three bridge locations at MP 101.05, 101.80 and 102.70 have a hydraulic study prepared prior to initiating repairs to determine if a more effective solution like replacement with a precast concrete box culvert should be undertaken.



Typical Minor Bridge

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BRIDGES (SIGNIFICANT) The rail line between Andrews and Murphy has three significant structures, two of which are steel and one timber spanned bridges. The following describe each bridge condition by location.

» At MP 100.50 a steel span bridge consisting of one Thru Plate Girder (TPG) approximately 80 feet long and both approaches constructed of twin steel beam spans (each approach measuring approximately 25 feet in length), is in overall good condition. Certain repairs to the approach, deck ties, wing walls, and bearing areas will be required before rail operations begin. Additionally, some strengthening of the TPG will be required to bring the span's level of utility to that capable of supporting projected loads. The TPG located at MP 100.50 was previously rated and failed to be able to support modern loadings. To obtain adequate load bearing (support for E72 loads), additional cover plates are recommended to bring the TPG to an acceptable level.



BR 100.50

» At MP 110.70 a 14 span (174 feet), 38 foot high timber trestle exists. This bridge is in very poor condition and requires replacing most (if not all) the timber members before any train traffic could resume. Its current classification is E36 (which is significantly less than expected loading requirements). Based on the inspection and analysis, it is recommended that the bridge be replaced with three (3), 60-foot steel Deck Plate Girder (DPG) spans supported by new abutments and piers rather than rebuild it with timber components. This is necessary to provide safe railroad operations, increase loading capacity and limit on-going maintenance.



BR 110.70

- » A steel spanned bridge is at MP 113.80 constructed of one 124-foot Pin Connected (Pratt) Thru Truss with a steel DPG (30 feet in length) on each approach to the truss. The bridge components are in poor to fair condition (bridge tie deck and walkway are in very poor condition) with no significant changes since being previously rated. For the bridge to support projected train loadings, it will require extensive strengthening of the members before any train is allowed to cross it. It is recommended that replacement of the center span thru truss with a single span TPG is provided for safe railroad operations, to increase loading capacity and limit on-going maintenance to a reasonable level.



BR 113.80

Details of existing conditions, copies of Stantec bridge inspections, and required repairs can be found in **Appendix**.

PHASING/ SCHEDULE OF BRIDGE REPAIRS

In prioritizing repairs along the Andrews to Murphy corridor, the project team recommends immediate action on the five bridges from south of Andrews to Palmer Lane at Airport Road in Marble, in association with the potential new industry location in Marble.

Bridge 110.70 (roughly four miles north of Murphy) needs immediate attention. As previously discussed, the 174-foot long timber trestle is in very poor condition and needs to be completely replaced. This process will take roughly three months of engineering, an environmental review/permitting process may run concurrently with the final engineering development. A six to nine month construction phase will follow permitting.

Another phase of rail line repair includes the bridge located at MP 113.80. This bridge requires the replacement of the thru truss. A similar time frame of approximately two to three months would be needed for engineering, plus permitting, followed by a construction period of approximately six to nine months.

The remainder of the bridges can be repaired concurrently with the significant bridge replacements in no particular order. The bridge repairs on these remaining bridges on average will take approximately two weeks per bridge.

PROBABLE CONSTRUCTION COST

Most of the rail bridges along this corridor are in need of different levels of repair or replacement. The following table illustrates a summary of the necessary repairs and an opinion of estimated cost (does not include contingency costs include in the final estimate). For a more detailed view of the opinion of expected repairs/replacement refer to **Appendix**.

Table 5.2

BRIDGE #/MILEPOST	TYPE OF REPAIR/REPLACEMENT	OPINION OF PROBABLE CONSTRUCTION COST (BEFORE PROJECT CONTINGENCY)
BR1/100.50	TPG Span Strengthening/ General Repairs	\$310,000
BR2/101.05	Timber Repairs	\$22,000
BR3/101.80	Timber Repairs	\$14,000
BR4/102.70	Timber Repairs	\$7,000
BR5/102.99	Timber Repairs	\$15,000
BR6/104.80	Timber Repairs	\$91,000
BR7/108.40	Timber Repairs	\$49,000
BR8/109.10	Timber Repairs	\$30,000
BR9/110.70	Complete Replacement with DPG	\$1,932,000
BR10/113.80	Center Span Replacement with TPG, DPG Approach Span Repairs	\$1,480,000
Total		\$3,950,000

Source: Stantec

RAIL LINE CROSSING CONDITIONS

There are sixty-six (66) roadway-rail crossings including sixty-four (64) at-grade crossings and two grade separated overhead bridges on the Andrews to Murphy section of the rail line.

This includes 17 public at-grade, 2 public grade separated and 47 private crossings. See full sized inventory map (separate document). Sixty of the crossings are registered in the Federal Railroad Administration (FRA) database.

The at-grade crossings show signs of wear and neglect. Most of the surfaces are asphalt with timber headers along the rail. Some are dirt or gravel. Warning devices are nearly all passive, that is private crossing sign or cross-bucks with advance warning signs. Only one crossing, Airport Road to the south of Andrews,

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has evidence of an active warning device system, in this case flashers. It is recommended that all of the crossings be resurfaced and warning devices be repaired to match original equipment. A summary of recommended repairs is provided in the table below. Specific locations are shown in project mapping.

Table 5.3

DESCRIPTION	REPAIRS
Resurface (Asphalt), Add Pavement Markings, Cross-Bucks, & Advance Warning Signs	34
Resurface (Asphalt), & Add Private Crossing Sign	26
Resurface (Concrete) Add Pavement Markings, & Reconstruct Flashers	1
Remove (currently out of service, remove surface only)	3
None (Overhead Roadways)	2
Total	66

There is some potential to consider consolidation of existing roadway/rail crossings to enhance safety to the driving public and improve railroad operations. Other improvements may include upgrading the warning devices with the installation of flashers or gates. The project team identified one location (Airport Road) where crossing gates may be warranted and ten public roads where flashers may be warranted.

The Rail Divisions' Engineering Safety Group has ultimate responsibility and authority to evaluate and identify crossing modification and closure sites. A complete evaluation of the rail line will be provided to ascertain the specific improvement needs.



TRACK CONDITIONS

The track structure is in reasonable condition for its age and has been maintained adequately in recent decades.

The A2M corridor is in good condition to allow access by hi-rail truck, but currently inadequate for railroad operations. Recent maintenance activities have focused on maintaining the basic track structure in anticipation of future reconstitution. Maintenance and repairs required for railroad operations include:

- » **Ties:** NCDOT Rail Division completed a tie replacement project in 2006. Approximately every fifth tie was replaced in an effort to hold gauge (keep the rails in place) to permit hi-rail truck access. The project team provided detailed evaluation of ties in select locations



throughout the rail line. This included inspection of 100 ties in 14 locations to provide a representative inventory of tie condition. It was found that slightly more than half of the ties (55%) were in need of replacement.

- » **Rail:** As noted above, the rail is a lighter weight (85-90#) section, about 100 years old. While this is not a fatal flaw, it is an item of concern. Rail of this vintage was rolled before modern metallurgical techniques such as controlled cooling and head hardening were commonly used. Based on site inspection, experience and professional judgment, it was estimated that 10% of the rail will need to be replaced. Detailed evaluation of rail by ultrasonic testing is needed to identify defective rail and determine the exact quantity and locations where replacement is needed.
- » **Ballast:** Additional ballast will be required to establish a consistent section (depth under tie and shoulder adjacent to tie) to support railroad loading. This is standard maintenance on any railroad.
- » **Embankment/Subgrade:** The embankment section will be expanded in several locations to accommodate additional ballast sections. Earth fill should be used in most locations. Rock fill should be used in areas where erosion is evident and/or adjacent roadways limit fill.
- » **Other Track Materials (OTM):** OTM includes miscellaneous track hardware such as spikes, tie plates, joint bars, bolts, rail anchors and turnout components. Repairs will include replacement of OTM as needed to bring the track into proper condition for safe railroad operations.
- » **Turnouts:** there are 15 turnouts (railroad switches) between Andrews and Murphy. It is anticipated that ten will be replaced and five will be removed.

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It is unlikely that significant improvements to the track structure will be warranted due to its use as a tourist rail line and/or light density freight line. Potential improvements would be evaluated on an as needed basis to meet specific needs and may include:

» **Improve Safety:** Crossing upgrades would constitute the most significant safety improvement along the rail line. In addition, a good track and bridge maintenance program is critical to providing safe railroad operations. Replacement of deteriorated structures as previously noted will provide safer railroad operations and reduce maintenance requirements and in turn the potential for lost time accidents.

Safety of adjacent properties and pedestrians is also matter of concern in reactivation of the rail line. One area of concern is the day school in Murphy at Connehetta Street. Sidewalk extension and installation of safety barrier fence will be needed to enhance safety of all users. Final design of reactivation will include detailed evaluation of similar safety issues.

» **Increase Loading Capacity:** If needed to meet heavy haul demands, rail replacement with a heavier section (136# RE) will be necessary along with track resurfacing and additional tie placement. This would likely require in-kind upgrades to adjacent infrastructure including bridges.

» **Increase Speed (Reduce Curves):** The existing track geometry will be sufficient to meet the rail service needs in the foreseeable future. A few sharp curves in the Murphy area limit the ability to significantly increase speed. However, other factors such as multiple crossing and proximity to the end of the rail line limit speed improvement potential as well. Straightening these curves would have considerable impact to surrounding hillsides and the environment, and likely be met with considerable public opposition. Higher operating speeds at the end of the line are not critical for the success of operating this rail line.



RAIL LINE ENCROACHMENTS

All along the corridor, encroachments occur to varying degrees of size, hazard and proximity to the track.

The types of encroachment vary from old cars/tractors/farm implements stored on railroad property, propane gas tanks stored on an old side track (at a former industry location), semi-permanent buildings (mobile homes) housed on the rail corridor to more permanent structures such as houses that may need to have lease agreements completed if they do not interfere with potential future expansion.

NCDOT Rail Division is in the process of surveying the easement and encroachments and researching lease agreements for the more permanent structures (houses) along the corridor. After a determination is made regarding the reconstitution of the line, additional lease agreements may be deemed necessary.

SAFETY IMPEDIMENTS

There are certain encroachments that act as safety impediments due to their proximity to the track. Examples of this include the machinery stored near the track at MP 107 (near Maltby Road) and the propane tanks stored on top of the former industry track (MP 113.4) just north of Murphy near Alverson Street. If the line were to be reconstituted, as previously mentioned, a clear corridor width of 25 feet from the centerline of the track on both sides should be cleared of all impediments.

WITHIN RAILROAD EASEMENT (ROW)

There are encroachments that fall within railroad easement (or ROW) that could potentially interfere with existing or future railroad operations or expansion. Even if the area of interest would not be restricted for future (or current) use, the close proximity of occupied residences would pose a potential safety hazard for the residents during railroad operations. These issues need to be addressed at the time of the initial reconstitution of the corridor. Examples of this type of encroachment include the mobile homes southeast of the track between the track and Airport Road near MP 106. Other permanent structures may fall within the corridor, but outside the clearance envelope and would not interfere with future expansion. They may, however, require a lease agreement.

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AESTHETICS OF RAIL LINE

Specific encroachments may not interfere with railroad operations; however, there may be instances where debris or structures become an aesthetic nuisance (especially when considering potential tourist excursion trips). One example is the partially refurbished building in Murphy near the end of the line. If restoration is not completed prior to new rail service, this may be unsightly for tourists.. Another example is the wood yard area north of Murphy. Working with encroachments (on NCDOT property) and nearby land owners to enhance the trip experience of tourists, from a visual perspective (i.e., plantings in certain areas), can bolster the long term success of tourist rail service.

If the rail corridor is reconstituted, the recommended 50-foot clearance envelope (25 feet on each side of track centerline) should be assessed and removal or mitigation of encroachments should occur. Encroachments that jeopardize safe and efficient railroad operations will be addressed as repairs are made to reactivate the rail line. Encroachments that enhance the aesthetic appeal of the site, namely for tourist operations, must be evaluated on an on-going basis.



RAILROAD OPERATIONS OVERVIEW

Many factors influence railroad operating practices including route length, curvature, grades, power (locomotive) equipment, shipping requirements, passing sidings, maintenance locations and crew labor agreements.

Train Performance Calculations (TPC) were undertaken on the ruling grade and associated freight haul capacity in each direction.

For westbound trains, the most critical point occurs at Mile 89.6 where the track charts indicate a 12 degree curve exists on a 4.2% grade. For eastbound trains it is at Mile 90.5 where there is a 3.9% grade on tangent track. Both of these locations are on the GSMR portion of the track.

The maximum number of loaded and empty cars which could be reliably hauled in each direction over the ruling grade was evaluated in consideration of current restrictions listed in the GSMR timetable as well as GSMR's current locomotive roster. GSMR Timetable # 111 indicates that the GSMR currently has two GP7 and two GP9 locomotives. Maximum rail car weight was established at 265,000 pounds.

Using these criteria, we calculated the maximum number of loaded or empty cars which could be reliably hauled in either direction using combinations of the existing GSMR locomotives as illustrated in **Table 5.4**. These are slightly conservative car counts which will allow for varying rail conditions and operating anomalies. The operation of longer trains may be feasible but could require doubling of the train on the steepest grades from time to time.

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Table 5.4

GP7/GP9 LOCOMOTIVES	WESTBOUND (NUMBER OF CARS)			EASTBOUND (NUMBER OF CARS)		
	EMPTIES @ 50,000 LBS	LOADS @ 265,000 LBS	LOADS @ 61,000 LBS	EMPTIES @ 50,000 LBS	LOADS @ 265,000 LBS	LOADS @ 61,000 LBS
1	8	1	7	9	2	8
2	16	3	14	20	4	18
3	24	5	21	31	7	27
4	33	7	28	42	9	36

Should additional locomotives be required, there are several factors which must be considered when selecting the appropriate size and type. Given the light rail weight, 85 pounds per yard, and the high degree of curvature found on the line (i.e., 13%) smaller four axle locomotives such as GP38s or GP40s should be considered. This is supported by the maximum weight allowed on the GSMR and Norfolk Southern's restriction on six axle locomotives on the Asheville to Dillsboro rail line. Given the steep gradients, any locomotive acquired should be equipped with extended dynamic braking. The GP40-2 locomotive would be an ideal candidate given the availability of surplus locomotives of this type. These are four axle locomotives with 3000 horsepower weighing 250,000 pounds. Using the developed car weights, the project team calculated the maximum number of cars one, two or three GP40-2 locomotives could reliably haul

over the ruling grade in each direction. Results can be found in **Table 5.5**. As with the existing locomotive calculations these are slightly conservative numbers.

Descending steep grades can be more challenging than climbing. The GSMR timetable requires the use of retaining valves on loaded cars while descending grades between Mile 87 and 97. By placing the retaining valve in the HP position the rail car will retain a 20 psi brake application. With locomotives equipped with extended dynamic braking systems, this practice may not be required for flat cars hauling empty containers.

If local passenger service is desired, it is assumed that a Budd Rail Diesel Car (RDC-1) would be used. The RDC-1 has the ability (under loaded rail car conditions) to negotiate the ruling grade

Table 5.5

GP40 LOCOMOTIVES	WESTBOUND (NUMBER OF CARS)			EASTBOUND (NUMBER OF CARS)		
	EMPTIES @ 50,000 LBS	LOADS @ 265,000 LBS	LOADS @ 61,000 LBS	EMPTIES @ 50,000 LBS	LOADS @ 265,000 LBS	LOADS @ 61,000 LBS
1	12	3	10	14	3	12
2	24	6	21	29	7	25
3	40	9	31	49	11	39

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both by itself or while hauling loaded passenger cars. RDC's use hydraulic torque converters and as a result of this type of technology do not have a continuous effort rating. We selected a minimum allowable speed of 10 mph and our results indicate that while a fully loaded RDC could negotiate the ruling grade in both directions, once coupled to a fully loaded passenger car the grades would prove problematic. If additional capacity is required multiple RDC's coupled together would be the solution.

OPERATION IMPROVEMENTS

Often times it is most economical to consider changes to items other than infrastructure to improve railroad operations. For example, operational deficiencies may be addressed by replacing locomotives, adjusting shipping schedules or adjusting working shifts. Given the low density expected on the A2M corridor, it is likely operations can be managed with the existing infrastructure. Physical improvements such as sidings, maintenance tracks, a



turntable, or wye track may be considered as specific needs (such as an additional industry) arise.

If the rail line is reactivated, it is uncertain who will be the operator. One scenario would be for the GSMR to extend operation on the A2M. The following discussions are presented assuming GSMR is the operator.

Based on discussions with GSMR representatives, their locomotive fleet satisfies their current tourist passenger needs. Should freight service be reinstated on the rail line additional locomotives would be required. Alternately, the coordination of railroad operations to minimize conflicts may alleviate this issue.

Serving a new customer at Marble may be accomplished in several ways. However, delivering 30 cars once a week presents several complications. This demand would require the entire GSMR locomotive fleet to make the grades between mile 87 and 97. Alternately with the purchase of additional locomotives, either three GP40-2 locomotives or a combination of GP40-2 locomotives and existing GP7/9 locomotives could be used. Once the train has arrived at Marble a runaround track with a 30 car capacity is required to allow car storage while switching the engines. Crossing locations in Marble will not allow for a continuous siding where a 30 car train would not block crossings. There is an opportunity to construct a 30 car siding in the vicinity of the Andrews/Murphy airport approximately three miles away. This would require the train crew to push the loaded cars from the industry over three miles to this siding with an employee riding the lead flat car. Alternately two 15-car tracks with access at both ends could be constructed adjacent to the main track at the industry. This would allow the train crew to double over the cars into two tracks and avoid the move back to the airport. This would result in the occupation of crossings while the train is doubling over.

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A more cost effective solution from a capital perspective may be to haul 15 cars twice a week. This would reduce the locomotive and new track requirements but would increase the operating and maintenance costs.

A number of improvements may be considered that could improve the operation and functionality of the railroad, such as:

- » Sidings at strategic locations
- » Passenger stations
- » Turntable or Wye Track in Murphy

Improvements of this nature must be evaluated on an ongoing basis as need arises.



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GSMR

(OVERVIEW OF IMPROVEMENTS NEEDED TO UTILIZE A2M IMPROVEMENTS)

Upgrades to the Great Smoky Mountains Railroad (GSMR) will include a few significant improvements to track, tunnels, and bridges.

- » To reinstate rail service, general track improvements are needed from Nantahala Gorge (MP 87) to Andrews (MP 100.1). GSMR has estimated the cost of repairs to be approximately \$4.4 million (the maximum contribution by the state would be 50%).
- » Track repairs similar to A2M
- » Tunnel expansion to accommodate modern rail cars (height and width)
- » Bridge improvements to accommodate modern rail cars (height and weight)

COSTS

Stantec’s opinion of construction cost to complete repairs to the A2M railroad corridor has been prepared in accordance with the repairs and improvements described above.

Costs have been based on professional experience and understanding of projects of similar nature developed over by individuals experienced in railroad design, contracting and construction. The cost of railroad repairs and improvements for the ultimate buildout will be:

- » **Railroad Repairs (reestablish Class 1/Class 2 service)** . \$10.3 million
- » **Railroad Improvements (siding)** \$1.0 million
- » **Railroad Improvements (crossing warning devices)** \$2.9 million
- » **GSMR Railroad Repairs** \$2.2 million
- » **Project Design/Construction Engineering & Inspection** . \$1.0 million

In addition, it is commonly understood that improvements to local infrastructure will be required at major stops to accommodate tourist and local passenger train operations. These improvements will include upgrades to depots, parking, pedestrian access, public restrooms and convenience facilities, local transit, and multimodal access to name a few. While this was not a main focus of this study, Stantec did develop a rough cost to be considered by local entities:

- » **Murphy Depot (Total Capital Cost)** **\$3 million**
 - Parking (deck or surface lot improvements) _____ \$1 million
 - Depot Rehabilitation _____ \$1.25 million
 - Off-site Enhancements
(ADA, sidewalks, shuttle, bathrooms, etc.) _____ \$750,000

- » **Andrews Depot (Total Capital Cost)** **\$2 million**
 - Parking _____ \$500,000
 - Depot Rehabilitation _____ \$1 million
 - Off-site Enhancements
(ADA, sidewalks, bathrooms, etc.) _____ \$500,000

Additional development scenarios and associated costs are indicated in **Table 5.6** detailed railroad track and bridge costs are included in the **Appendix**.

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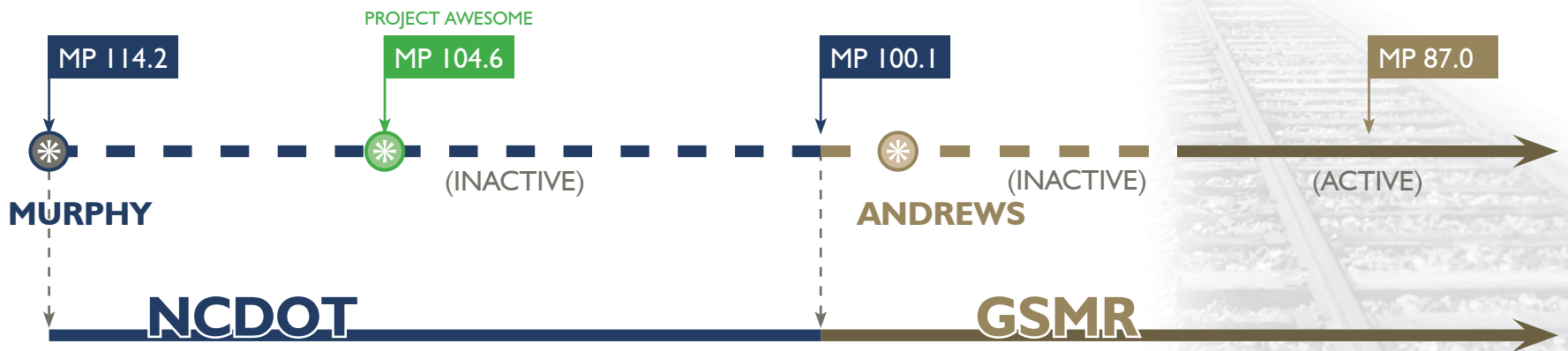
Table 5.6 Andrews to Murphy (A2M)—Development Scenarios

Excursion & Minor Freight		Project Awesome- No Excursion		Excursion & Project Awesome	
WORK ELEMENT:	COST (MILLIONS)	WORK ELEMENT:	COST (MILLIONS)	WORK ELEMENT:	COST (MILLIONS)
REPAIRS: Track & Structures (MP 100.1-114.2)	\$10.3	REPAIRS: Track & Structures (MP 100.1-104.6)	\$1.8	REPAIRS: Track & Structures (MP 100.1-114.2)	\$10.3
IMPROVEMENTS: Siding	N/A	IMPROVEMENTS: Siding	\$1.0	IMPROVEMENTS: Siding	\$1.0
IMPROVEMENTS: Crossing Warning Devices (MP 100.1-114.2)	\$2.9	IMPROVEMENTS: Crossing Warning Devices (MP 100.1-104.6)	\$0.6	IMPROVEMENTS: Crossing Warning Devices (MP 100.1-114.2)	\$2.9
REPAIRS: GSMR Track & Structures ¹ (MP 87.0-100.1)	\$2.2	REPAIRS: GSMR Track & Structures ¹ (MP 87.0-100.1)	\$2.2	REPAIRS: GSMR Track & Structures ¹ (MP 87.0-100.1)	\$2.2
Design & CE&I	\$1.0	Design & CE&I	\$0.5	Design & CE&I	\$1.0
Total Cost	\$16.4	Total Cost	\$6.1	Total Cost	\$17.4

NOTES:

¹ Total Cost as estimated by GSMR = \$4.4 million; however the maximum contribution by the State would be 50%.

Other project costs include \$5 million for depot, parking & local infrastructure improvements; anticipated to be addressed by others.



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06 Evaluate Market & Investment Viability



MARKET ASSESSMENT PROCESS

Both qualitative and quantitative analytic measures were used in this study, in part to ensure that the local insights of people highly familiar with the economic development potential could participate in and inform other parts of the study.

The assessment of the economic impacts was comprised of three separate but inter-related efforts, summarized in the following paragraphs.

STAKEHOLDER INTERVIEWS An interview script and basic mapping were developed to provide a framework to gather consistent information from stakeholders in the local/regional vicinity. This information, balanced with the opinion of economic development specialists, helped to inform the recommendations for reestablishing rail service along the Andrews to Murphy rail line. Stakeholders ranged from elected officials to economic development professionals to private business owners. Interviews were conducted either face-to-face or via telephone. Respondents were asked to identify the approximate location, type and likelihood of development both with and without rail service, as well as identifying which type of rail service (passenger, freight or tourism) was most likely to be associated with redevelopment efforts. Each respondent was also given an open-ended opportunity to provide any

information that they wished to contribute, as well as identify other people for interviews. The goal of these stakeholder interviews was to ascertain likely levels of development from various types of rail service.

COMPARATIVE CASE STUDIES The consultant team conducted interviews of four railroad companies that had similar service profiles as the proposed A2M Project. Participants generally included staff of the railroad operator and others (e.g., chamber of commerce) that had involvement with the railroad operation to provide a more complete picture of the operation and its initial founding. One of these four cases (Piedmont & Northern Railway; Gaston County, NC) was devoted strictly to providing freight rail service, while the other case studies were principally concerned with tourism rail (sometimes termed “excursion” rail service). The goal of the comparable case studies was to help delineate the extent of the economic impact from the service, as well as its likely timing. The use of comparative case studies provided both a practical grounding of various

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categories of assumptions for the quantitative modeling, and a source of information about what strategies work to make rail services successful.

ECONOMIC MODELING Detailed evaluation of the economic landscape was completed to ascertain the potential of the project to positively impact business and industrial development in the region. The economists utilized TREDIS,™ a computer model that relies on input-output economic analysis to describe the impacts from various transportation infrastructure or service improvements. This NCDOT-approved economic model was used to develop baseline economic development potential along the rail corridor. However, interviews and surveys were used as input variables in the TREDIS model. Our economists used the TREDIS model output to help quantify economic impacts from both freight shifts from truck service to rail service, as well as contingent impacts associated with new or expanded industries that rely on tourism rail. Three model runs were created: a “Most Likely” scenario based on current development patterns and observations from the comparable case studies and stakeholder interviews, then “Pessimistic” and “Optimistic” scenarios that looked at a 15% range of decrease or increase in the amount of contingent business development/redevelopment that might occur partially or wholly as a result of the A2M Rail Project.

Four tiers of rail service were considered initially, including:

» **Local Passenger Rail:** service among local destinations such as Andrews to Murphy, possibly extending to Bryson City, between casinos, to points of interest such as the Nantahala Outdoor Center (NOC). Service would likely be provided by a single passenger car as described in **Section 04**.

» **Regional Passenger Rail:** service to regional destinations such as Asheville, Charlotte or Atlanta similar to Amtrak.

» **Tourism Rail:** recreational railroad similar to GSMR or Blue Ridge Scenic Railway. Typically a destination for people with specific interest in railroading.

» **Freight Rail:** transportation of bulk commodities to industries and production facilities.

Due to the rugged terrain of the Murphy Branch, the lack of a through connection (no existing rail line to the south) and the lack of population density (demand for services), as well as non-competitive travel times (compared to private auto travel), local passenger rail was a less likely option than either tourism or freight-based rail services. It is noted that passenger rail was discussed during the one-on-one stakeholder interviews. Therefore, the concept of regional passenger rail service was deemed cost-prohibitive to pursue in detail.

ECONOMIC MODEL ASSUMPTIONS

The assumptions made in the technical analyses for economic impacts are standard practice: a specified discount rate (3%) applied to future costs and revenues; travel distances and times for commodities moved by truck and rail; and a phase-in period to realize full economic potential of businesses reacting to the presence of rail service, to name a few. The model contemplated a 2028 analysis year, which assumes a three-year build-out period for the rail system ending in 2018, and a subsequent 10-year “ramping” period for businesses to expand and relocate to the area to take advantage of economic opportunities afforded by the proposed new services. These assumptions were included as part of the standard TREDIS™ model platform, or informed by the stakeholder and comparative case study analyses.

STAKEHOLDER INTERVIEWS

As part of the initial round of research, 21 interviews with local stakeholders were conducted to ascertain the local opinion of influences on the success of the proposed reactivation of the Andrews to Murphy rail line. The following is a list of the affiliations of those interviewed:

- » Blue Ridge Mountain EMC
- » Town of Murphy Government Official
- » Cherokee County Chamber of Commerce
- » Town of Andrews Government Official
- » Cabin Rentals Real Estate
- » Highlander Gallery & Emporium/Blue Ridge Highlander Travel and Tourism Magazine
- » Andrews Police Department
- » Cherokee County Transit
- » Andrews Chamber of Commerce
- » Southwestern Commission/Southwestern RPO
- » Cherokee County EDC
- » Economic Development Tri-County Community College
- » Cherokee County Economic Development
- » ValWood Corporation
- » Parker & Reichman, Inc.
- » Andrews Valley Initiative
- » Wells and West, Inc.
- » Appalachian Regional Commission/NC Dept. of Commerce
- » Southeast Industrial Development Assoc. (SEIDA)
- » AdvantageWest
- » NC – Department of Commerce

Respondents were asked a total of ten questions, the first three of which were related to their identification. The remaining seven questions asked the participants about the degree of development in the Murphy, Marble, and Andrews areas with and without any new rail service (passenger, tourism, and freight rail were described to each interviewee in general

terms), as well as questions about the type of development that might occur that the new rail service might induce (assuming that there were positive differences between the without-rail and with-rail scenarios), redevelopment potential for existing businesses, and any additional comments or people that should be contacted as part of the study. The complete survey form is shown in the **Appendix**.

Figure 6.1 First page of survey form

1. Date of Interview: _____
 2. Name: _____
 3. Title, Affiliation: _____, _____

Description of Project Scenarios (investments described below are not funded or planned)

a. *Freight Rail Transport.* The movement of bulk or containerized cargo long distances, connecting with regional markets through existing rail corridors. Service is irregular, dependent on shipping needs with stops at distribution centers, warehousing, and / or manufacturing locations. Potential for occasional tourism service, but isn't a priority in this scenario. Improvements to tunnel and bridge structures are necessary, as is reliable external rail service to adjacent railroads (GSMR & NS).

b. *Tourism Rail.* "Railroad as destination" with an emphasis on passenger amenities, sight-seeing, special events, and stops at casinos, rafting centers, downtowns, and other tourism destinations. Average service 1-2 times daily with seasonal highs and lows.

c. *Passenger Rail Service.* Emphasis on service that connects with parking facilities and major employment, schools, recreation or business centers (town centers, airport). Rail service 2-4 times daily.

For both (b) and (c) options, investments in station areas, platforms, and parking areas as well as coordination of transportation services to local destinations (e.g., casinos) are considered parts of these scenarios.

For each scenario described above, answer the next five questions:

4. For each of the three areas shown (A, B, and C), which areas have developments coming in the next five years without the A2M Project? (1 to 5 rating, with "5" being certain to develop)

5. Assuming that the A2M Project was in place today, which tracts are likely to develop or redevelop in the next five years? (1 to 5 rating, with "5" being certain to develop)

6. Looking at pictures of various development types on the next two pages, for each tract with a number greater than "1" from the previous question, identify the type(s) of development that potentially could result if the A2M Project were constructed.

7. Based on what you have heard about the A2M Project, how far away would the influence extend for the A2M Project? (check all that apply)


- Inside Cherokee County
- From adjacent counties
- Inside the State
- Outside the State

8. Which already-developed or developing properties are likely to realize increases in revenues or the number of employees as a result of the Project? (name and identify on map)

A. *Freight Rail Transport:* _____
 B. *Tourism Rail:* _____
 C. *Passenger Rail:* _____

9. Anything else you would like to add that we have not covered already?

10. Thank you - are there other people that we should speak to with respect to the potential impacts of the A2M Project?

 _____ |

The typical responses to a few of the questions are discussed in the following paragraphs.

Amount of Development Potential With and Without Rail Service

Figure 6.2 suggests that interviewees generally felt that Murphy had a very good (4 out of 5 rating) potential for development without any rail service, with Marble and Andrews not as strong. Several respondents commented on the importance of the proposed casino development in the vicinity of Murphy as their reason for ranking it highly. With rail service (most respondents suggested that tourism rail was their consideration for evaluating this question, although a few people did consider freight rail service in their responses) the potential for development is better in every case, with a particularly strong increase in the vicinity of Andrews.

Figure 6.2 Development Potential with/without Rail Reactivation

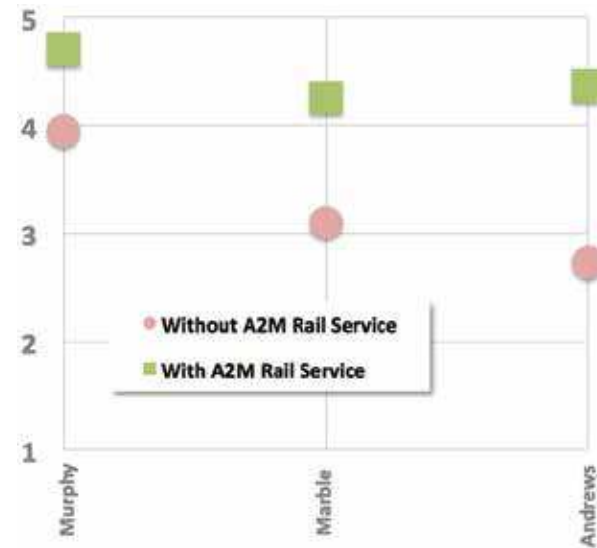
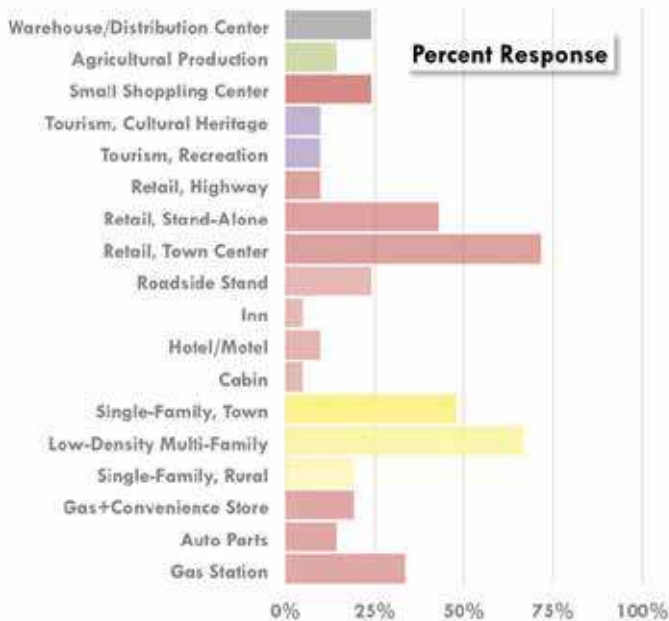


Figure 6.3 Potential New Development Spurred by Rail Reactivation



What Type of New Development Would be Spurred by Rail Reactivation

In order to provide a degree of consistency in the interpretation of land use typologies of different respondents, a set of pictures was shown to each interviewee that represents a range of likely development types in the study area (pictures of existing developments were used when possible). If a respondent rated one of the three geographic subareas (Murphy, Marble, Andrews) as having a higher development potential with rail reactivation than the development potential without, they were asked to identify what types of development they could foresee from the project.

Figure 6.3 illustrates the responses (note: bar colors represent those commonly used in the land use planning/ zoning profession), which tended to favor town center development (particularly in the case of tourism rail); residential developments were also commonly cited as a development type more likely to occur with than without rail reactivation. People also described restaurants specifically as a particular type of retail establishment likely to develop in reaction to new tourism-based rail service.

What is the Geographic Area from which a Type of Rail Service Would Draw

Interviewees were also asked about their thoughts on the area from which a particular type of rail service would draw customers, either in terms of riders or freight. The results, shown in **Figure 6.4**, indicate the following:

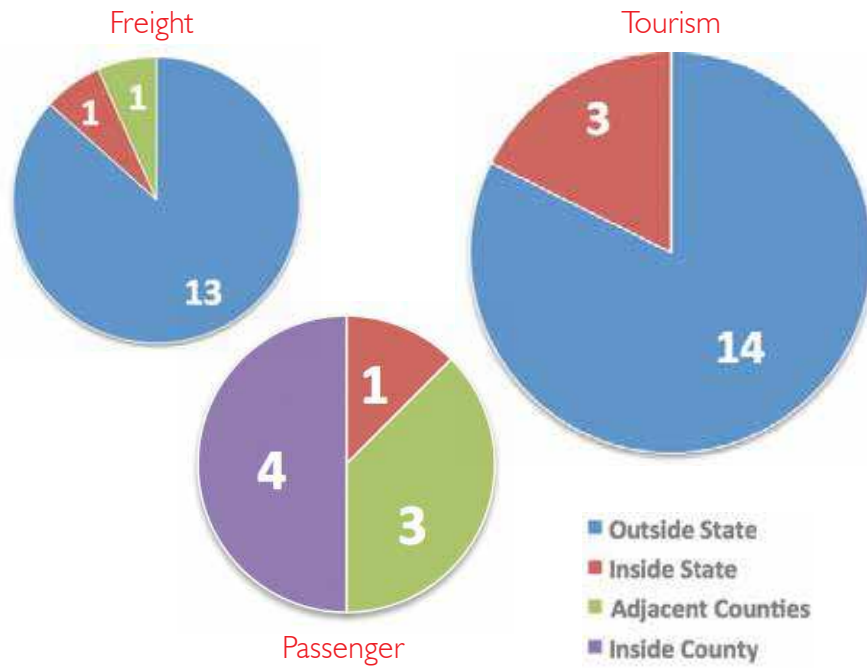
- » Few people thought that passenger rail was truly viable, and elected to not answer the question;
- » Tourism rail was answered more frequently than freight (slightly); and
- » Both tourism rail and freight rail service would likely draw the majority of customers from outside of the State.

Businesses Likely to Redevelop or Expand as a Result of A2M Rail Reactivation

Interviewees that answered this question suggested that town centers were likely to benefit from tourism (or passenger) rail service reactivation. Others suggested that expanded tourism-based ventures like outdoor centers, gambling, or other related businesses would likely occur should tourism-based rail service be reactivated in the area. Those interviewees who answered concerning freight rail service cited vacant or under-utilized warehousing/distribution buildings (e.g., Coates American, Baker Building) or some of the current manufacturing/agricultural industries in the area.

In coordination with NCDOT and the NC Department of Commerce, the project team learned of a potential new industry coming to the Marble, North Carolina community. Although this information is somewhat confidential, it has the potential of having a significant impact to the A2M Rail Reactivation Study and its findings, in particular, as it relates to bulk freight rail service. The proposed facility would include the redevelopment of an existing industrial site. Although in its infancy, this new proposal includes redevelopment of the site and associated freight rail service that would translate into a \$14 million investment with a potential of generating 320 jobs within a five-year horizon. Average salary wages would be approximately \$31,000 annually. The potential for complementary and incidental development to support this new industry exists, but would be difficult to quantify at this time.

Figure 6.4 Potential Geographic Draw of Rail Services



The rail operation necessary to support this new industry would include up to 30 cars per month (one or two trains), double-stacked, and would necessitate the upgrade of the existing tracks and infrastructure. Preliminary cost estimates range from \$750,000 for basic track upgrade to \$2.5 million for bulk freight operations. With this in mind, the tenant prefers to be operational within the next six months barring any major construction or permit limitations.

ADDITIONAL COMMENTS

A number of respondents provided additional comments not previously considered during the interview process. Comments were generally supportive of the overall reactivation, including the following:

- » We have seen more requests for businesses needing freight rail service, perhaps 1 out of 4 or 5 are asking for rail;
- » If rail isn't available then you don't see those projects and they are never factored into the development potential. With rail they can respond to project requests more robustly even for companies that do not require, but prefer, to have rail service. Rail would be a real asset to Cherokee County;
- » There was a \$300 surcharge on each carload to NS; getting feed from Cincinnati was about \$3,500/carload, which equates to about four truckloads. In the best year Parker & Reichman ordered 250 cars; and
- » There is some interest in the County with Andrews being the residential area for casino employees, and there is general interest in providing more affordable and flexible public transportation services.

The complete set of survey responses and interviewee contact information/interview dates is provided in **Appendix**.

Comparative Case Research: Post-Construction/Service Benefits

This section summarizes information collected during interviews with comparative rail line owners, rail operators, and local economic development staff. The interviewees were provided with a list of interview questions that focused on rail service inception, operations & maintenance, and economic development. **Table 6.1** lists the comparative case studies and background information on each rail line. As the interviews progressed, it became evident that a successful rail program relies on a number of factors. These factors are discussed in the subsequent paragraphs.

Table 6.1 Comparative Case Study Railroads

	REACTIVATION DATE	TYPE OF SERVICE	RIDERSHIP/ COMMODITIES	OPERATING SEASON
Great Smoky Mountains Railroad (GSMR) <i>Swain County, NC</i>	1988	Tourism	180,000/yr	Year-round (seasonal peaks)
Blue Ridge Scenic Railway (BRSR) <i>Fannin County, GA</i>	1999	Tourism	70,000/yr	March-Dec.
Durbin & Greenbrier Valley Railroad (DGVR) <i>Randolph County, WV</i>	1999	Tourism	45,000/yr	March-Dec.
		Freight	2,500 cars/yr Lumber, scrap iron, highway salt, aggregate	
Piedmont and Northern Railroad (PNR) <i>Gaston County, NC</i>	2010	Freight	As needed for bulk commodities	

Interview responses indicated that preservation was the primary impetus for pursuing new rail service. All three tourism rail owners stated that their respective rail lines were in danger of being abandoned. In addition to the preservation element, local enthusiasm and volunteer support were also influential factors.

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REGIONAL PARTNERSHIPS In all of the cases studies, government collaboration was a vital component of rail service inception. A range of public-private partnerships was employed for start-up purposes. In the early years, each state owned its respective rail line and investor groups were created to either purchase or lease the rail lines. In the case of the BRSC, the State placed lease payments from BRSC into escrow to be used to fund maintenance during the first several years of operation. In the case of the DGVR, the State assisted with purchasing the rail line and funding initial repairs. The Randolph County Economic Development Authority assisted the DGVR by purchasing the rail yard then deeding it to the DGVR under a match agreement in which the DGVR investor group purchased trains and buildings.

In addition to private funds and revenue generated by the rail lines, government collaboration is evident in financing operation and maintenance (O&M). State grant programs (typically match programs) and transportation enhancement grants helped raise capital for large improvements such as tunnel expansions on the GSMR or DGVR bridge replacement projects. Other O&M funding strategies included raising the local occupancy tax by 1% to help fund railroad and local economic development projects (GSMR), pursuing tax credits for track maintenance (BRSR), and taking advantage of state tax exemptions for transportation services and state funding for bridge inspection and maintenance (DGVR).

Despite the availability of government grants and funding assistance, O&M budgets are often tight and profit margins are low in many cases. A very high ridership is needed to make tourism rail service profitable. Although it is now a portrait of a successful tourism rail program, the BRSR operated without

profit for the first eight years of service. In the case of the DGVR, freight revenue currently offsets O&M costs and other capital needs associated with tourism rail. The DGVR also receives lease payments from tenants in its rail depot.

In addition to funding challenges, interviewees identified other obstacles including limited parking, operating losses during the off-season, service logistics, maintaining affordability for passengers, and the level of effort required to maintain safety and liability compliance. The most frequently mentioned obstacle was parking, as the train depots are situated in small mountain towns where topography limits the potential to expand parking options. Current solutions

include the use of shared-parking with local government offices (GSMR) and churches (BRSR) or charging parking fees to offset costs associated with leased parking lots (GSMR). Bus tours comprise a large portion of the DGVR ridership, which also minimizes the effects of limited parking.

BUSINESS DEVELOPMENT AND PARTNERSHIPS

A well-planned marketing campaign was another common theme to the success of the tourism rail services. It was evident that each rail line was very proactive in multiple marketing arenas. In addition to sophisticated websites with videos and detailed maps, each rail line produces seasonal visitors' guides that provide information on lodging, recreation, shopping, concerts/events, and other attractions, in addition to excursion details. These joint marketing efforts involve local Chamber of Commerce participation to create a link between the community and the rail service. These guides also include advertising space that can be purchased by local businesses. In the case of the DGVR, these materials are also used for marketing at bus tour



Courtesy of Great Smoky Mountains Railroad

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Courtesy of Randolph County Visitor's Center

trade shows. In addition to providing advertising space within the visitor's guide, the BRSR also has opportunities for car sponsorship.

All interviewees noted relationships with local businesses, most notably rafting companies. While the GSMR provides direct service to the Nantahala Outdoor Center (NOC), other rail lines partner to offer rafting packages. The BRSR partners with local hotels to offer a 10% reduction for rail tickets, among other efforts, and the DGVR collaborates with the American Mountain Theatre and Gandy Dance Theatre (Branson-style music theatres).

Another successful marketing approach shared by all three tourism rail services is the creation of a variety of excursions, including theme trains. While some of these themes require purchased licensing through media companies such as Warner Brothers and Walt Disney (Polar Express, Peanuts, Dinosaur Train, Chuggington) other, non-licensed, themes include Easter Trains, Pumpkin Trains, and Santa Trains—in addition, of course, to fall leaf season excursions. The DGVR offers overnight caboose camping on rail spur lines and the GSMR rents caboose

cars for private parties. The following summarize these and other factors in creating success, as identified by interviewees:

- » Geographical location and highway accessibility from metropolitan areas (All rail lines are accessible from metropolitan areas via four-lane freeways)
- » Variety of excursion themes and packages (Variety keeps markets broad, allows catering to both family and adult get-away themes, and contributes to a longer operating season)
- » Variety of classes (Open Air, Coach, Crown, First Class) (Maintains affordability and provides desired levels of "creature comfort")
- » Food commissary and catering services (Expands themes i.e. Murder Mystery Dinners, etc.)
- » Large number of volunteers (Helps lower O&M costs; noted as crucial to BRSR operations)
- » Maintaining small town charm (A main focus in the rapidly growing Blue Ridge, GA area)
- » "Entrepreneur friendly" business community (Fannin County, GA has financing programs for business start-up)
- » Maintaining a light amount of freight operations (Identified by DGVR as a main source of revenue)
- » Showcase historic tourism, recreation
- » Market to bus tours
- » ARC contributions for broadband and water/sewer



Courtesy of Great Smoky Mountains Railroad



Courtesy of Durbin & Greenbrier Valley Railroad



Courtesy of Durbin & Greenbrier Valley Railroad



Courtesy of Durbin & Greenbrier Valley Railroad

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ECONOMIC DEVELOPMENT IN THE COMMUNITY

As noted in the previous section, tourism rail is not a particularly lucrative enterprise. Most revenue is allocated directly back into infrastructure maintenance and other operating costs, and high ridership (and frequently tax credits or other public sector participation) is needed to ensure continued operation. The need for high ridership helps create and fortify business relationships that help keep the rail lines operating while also building the local economy. Tourism rail and economic development are tightly woven together and there is a clear synergy between rail companies, Chambers of Commerce, and local businesses.

Job creation through the rail service is one positive economic benefit to the community. The three tourism rail lines all have full-time, part-time, and seasonal employees, with ranges varying primarily by the amounts of volunteer support. The GSMR employs 40 full-time employees and up to 150 seasonal employees. The BRSR employs 20 full-time employees and utilizes a volunteer base of roughly 150 people. The DGVR employs 32 full-time employees and seven part-time employees, with two-to-three volunteers.

In addition to job creation, interviewees noted that tourism rail service has helped attract hotels, restaurants, and retail. In spring 2014, five new businesses opened near the GSMR depot in Bryson City. The BRSR is in downtown Blue Ridge, which boasts 37 antique shops, specialty shops, and art galleries as well as 12 restaurants and cafes. DGVR interviewees stated that the tourism

rail service was the main driver of economic development in Elkins, as evidenced by the success of the American Mountain Theatre and Gandy Dance Theatre. Interviewees noted that Randolph County, where Elkins is located, is one of only 15 counties in West Virginia projected to experience growth.

Courtesy of Durbin & Greenbrier Valley Railroad



Courtesy of Blue Ridge Scenic Railroad

THE ROLE OF FREIGHT TRANSPORT IN ECONOMIC SUCCESS

Of the four case studies, only one—Piedmont and Northern Railroad (PNR, Gaston County, NC)—identified freight transport as its primary objective. The PNR operation has no tourism/excursion rail services; it is also the most recently reactivated of the four operations studied, having started operations in 2010. At this point in time, the PNR is generally pursuing one or more large customers to help anchor the operation overall and provide it with sufficient revenue to make it profitable, but is not planning on any type of passenger service. The PNR is owned by NCDOT Rail Division and operated by Patriot Rail, a shortline holding and operating company. Without the investment by the State of North Carolina and operating efficiency by Patriot Rail it is unlikely the rail line would be reactivated.

The Durbin & Greenbrier operation utilizes fees from freight transportation to help subsidize maintenance costs for the tourism rail operation, with approximately 2,500 cars being shipped annually. Based on discussions with the Durbin & Greenbrier staff, there have not been any serious conflicts between the passenger and freight operations, primarily because

of (a) the infrequency of freight transport, and (b) the fact that people and freight are not on the line simultaneously. The DGVR operator would like to see more freight operations to further increase revenues.

Figure 6.5 provides an interpretive summary of success factors identified for the three tourism-based rail operations surveyed for the A2M Project. Some success factors—government subsidization/grants, tourism affiliations, and family-oriented service components—are commonplace, while others are more closely allied to only one or two of the three tourism rail operators.

DIRECT ECONOMIC AND CONTINGENT ECONOMIC BENEFITS

Description of Economic Modeling Effort

The economic analysis team compiled and reviewed the data gathered in preceding tasks. TREDIS (Transportation Economic Development Impact System)TM was another tool (along with engineering judgment of costs) used to assess the economic impacts of potential rail reactivation. TREDIS is modeling software used and endorsed by NCDOT to help analyze both freight and contingent development (jobs and businesses at least partially dependent on the proposed rail reactivation) impacts from proposed rail reactivation scenarios. TREDIS is an integrated analysis system for transportation planning and project assessment—designed to cover a wide range of applications, from looking at the benefit/ cost impacts of a single transportation investment, to analyzing the macroeconomic impacts of alternative long-range plans. TREDIS is also the model currently used to help assess economic benefits in the project prioritization system utilized by the North Carolina Department of Transportation (NCDOT). It covers impacts to passenger

¹Economic Development Research Group, Inc., TREDIS® Overview Document Version 3.6.4, 2010. www.tredis.net.

and freight travel across all modes, and it assesses costs, benefits, and impacts across a range of economic responses and societal perspectives. TREDIS operates as four separate but interconnected “core” modules: Travel Cost, Market Access, Economic Adjustment, and Benefit-Cost Analysis (BCA)¹. The primary function of the TREDIS model used for this project was related to the travel time benefits of converting some truck trips to rail, estimating the job/financial benefits from development contingent on the rail reactivation, and describing the economic benefits in net present value (\$2014) terms.

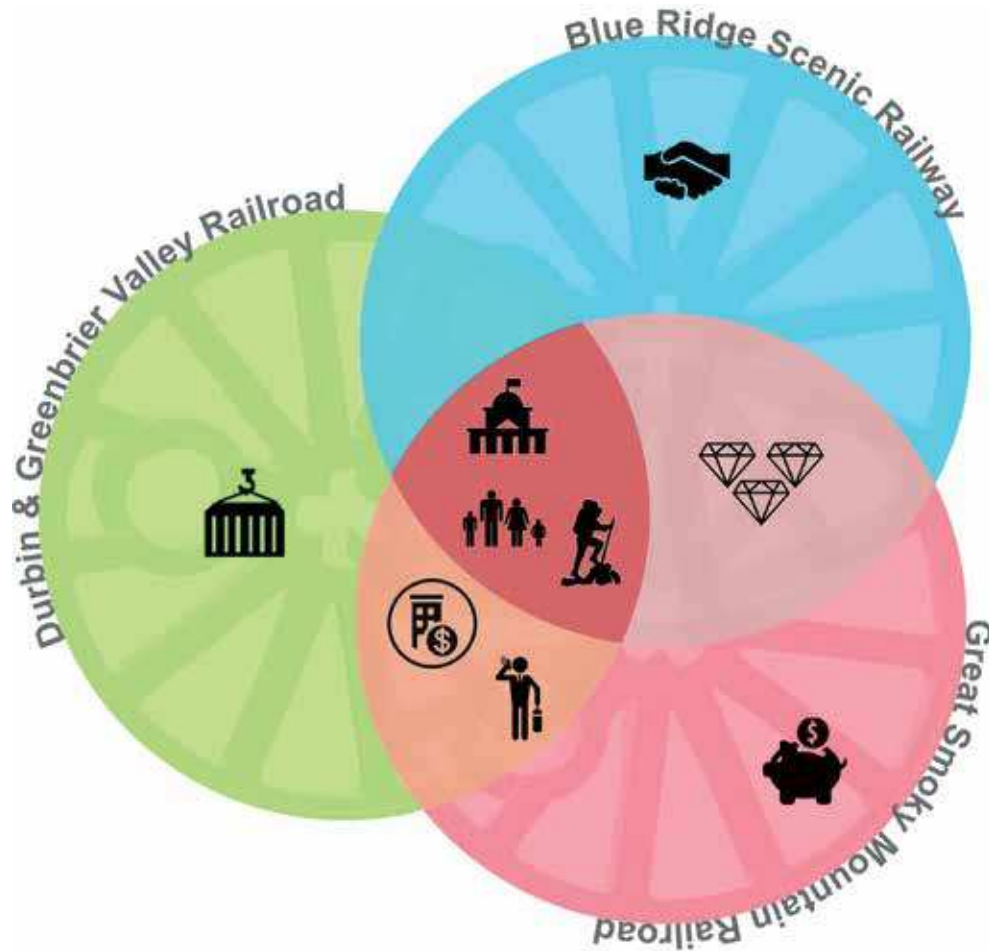
As with any technical model, utilizing locally derived inputs is desirable to help create a model and results that are more uniquely calibrated to the existing conditions of the study area (in this instance, Cherokee County, North Carolina). Specific inputs that were influenced by the research of local conditions and/or comparative case studies included development types, development intensities, timing of development actions, range of pessimistic to optimistic conditions, and fuel taxes.

The EDR Group, the creators of the TREDIS model, was consulted on multiple occasions during the modeling process, and they reviewed the model inputs and outputs used to produce the results described in the following sections.

Scenario Development

The proportion of estimated contingent development—the new or expanded development and job creation related wholly or partially to the proposed reactivation of the A2M rail project—is shown in the following figure (**Figure 6.6**), which utilizes the land use categories described by the TREDIS model. Forecasted job types and numbers were developed based on current job trends as well as inputs from local stakeholder interviews and non-local interviews with various active rail operators.

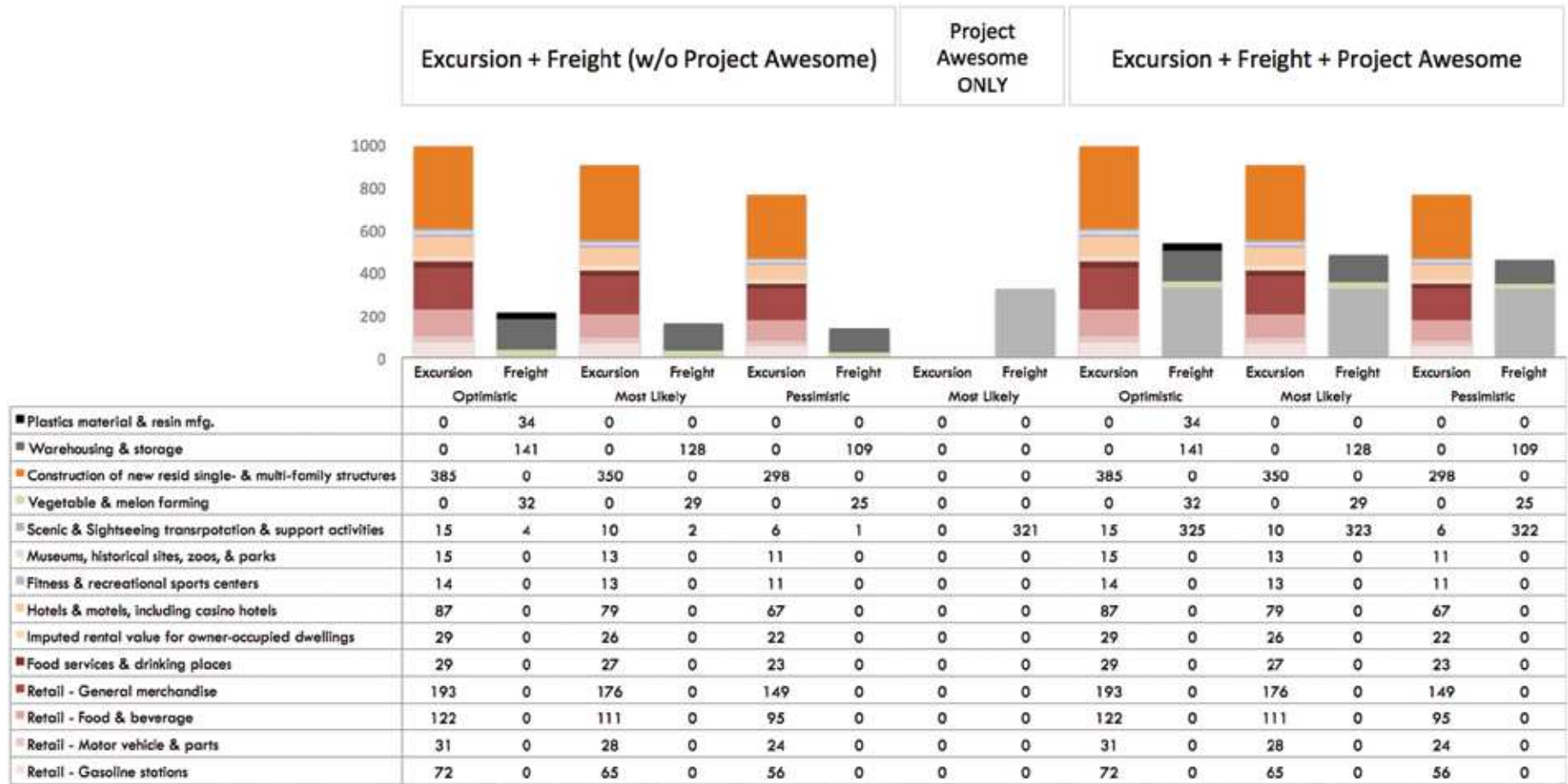
Figure 6.5 Summary of Tourism Rail Case Studies



- 
VOLUNTEER FOCUS
Maintenance, management, marketing, and guides can be volunteer-based, helping offset operating costs.
- 
GOVERNMENT SUPPORT
Initial purchase of rolling stock and right-of-way, and ongoing tax credits help offset start-up & maintenance costs.
- 
HIGH AMENITY FOCUS
In-car dining, air conditioning, and themed rides targeted at higher income shoppers diversify the customer base.
- 
FREIGHT / SHIPPING
Rare, but valuable source of income in the case studies; may require additional staffing and facility requirements.
- 
TOURISM PARTNERSHIPS
Taking advantage of outdoor recreation, downtown tourism, and existing outreach tools leverage marketing funds.
- 
INNOVATIVE FINANCING
Partnering with museums, maintaining a business-friendly attitude, and leasing arrangements bring additional revenue.
- 
PRIVATE SECTOR SUPPORT
Shared parking with private lot owners can be critical, as can catering, outdoor service, and other partnerships.
- 
HIGH VALUE
Orienting travel packages to budget consumers and "day-trippers" helps to diversify and attract ridership.
- 
FAMILY FOCUS
Often value-conscious, families look for shorter trips, special packages with hotels, and targeted marketing efforts.

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Figure 6.6 Number of Employees Added Under Each Modeled Scenario



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Figure 6.7 Inputs and Output Results from Modeling

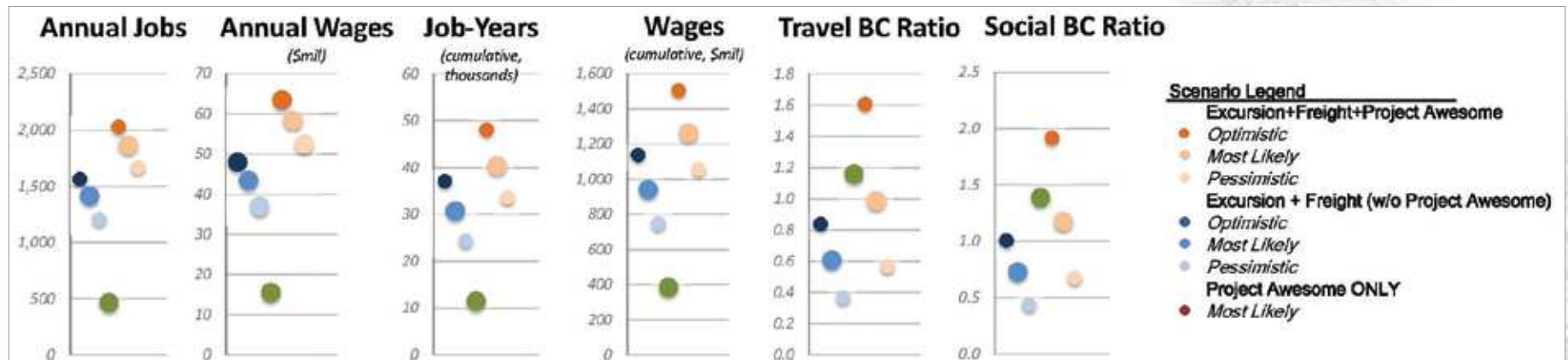
	Excursion + Freight (w/o Project Awesome)			Project Awesome	Excursion+Freight+Project Awesome		
	Optimistic	Most Likely	Pessimistic	Most Likely	Optimistic	Most Likely	Pessimistic
Annualized Measures (\$2014)							
Analysis Year of Full Build-Out	2026	2026	2026	2026	2026	2026	2026
Cost of Capital Construction	\$13.1m	\$16.4m	\$23.0m	\$6.1m	\$13.9m	\$17.4m	\$24.4m
Annual Operations & Maintenance	\$540,000	\$680,000	\$950,000	\$220,000	\$540,000	\$680,000	\$950,000
INPUTS							
Truck Trips	2,474	2,249	1,912	1,500	4,723	3,749	3,036
Rail Cars: Total Project Awesome	594 0	540 0	459 0	360 360	1,133 540	900 360	729 270
Employees: Excursion Freight	992 211	898 160	761 135	0 321	992 532	898 481	761 456
Project Awesome Employees ONLY (1)	0	0	0	321	321	321	321
Year Full Employment Reached	2024	2026	2026	2021	2024	2026	2026
OUTPUTS							
Annual Jobs (2)	1,566	1,418	1,210	467	2,032	1,871	1,673
Annual Wages (\$mil) (2)	48	44	37	16	64	59	53
Cumulative Job-Years (thousand) (3)	37	31	24	12	48	40	34
Cumulative Wages (\$mil) (3)	1,141	944	750	385	1,508	1,268	1,060
Travel-Related Benefit-Cost	0.8	0.6	0.4	1.2	1.6	1.0	0.6
Total Benefit-Cost (4)	1.0	0.7	0.4	1.4	1.9	1.2	0.7

(1) Figure obtained directly from client

(2) After 2025 when full development potential is achieved; measured in job-

(3) Cumulative from project start in 2016 to 2042

(4) Includes societal and environmental benefits



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Scenarios that were modeled generally included Most Likely, Optimistic, and Pessimistic based in part on the range of responses and comparative case study research. Including these scenarios helped to better understand the range of outcomes due to inherent variability in economic forecasting. A description of these scenarios follows.

Note that all of the scenarios modeled truck and freight rail movements, although pessimistic and optimistic scenarios changed the amount of truck traffic that would be shifted to rail transport if the A2M rail corridor were to be reactivated. Also, options that included Optimistic Scenarios anticipated that volunteers or private sector participants would assist to a small degree with offsetting some of the annual operating costs of the excursion rail service, a conservative estimate given the large amount of volunteer support provided to the Blue Ridge Rail operation, for example (although other operators researched did not cite much, if any, volunteer assistance that would offset operation or maintenance costs). The analysis year of 2026 was chosen for every scenario since ten years after completion of the rail service typically provides sufficient time for the economic impacts of the service to be fully realized, although additional benefits would continue to accrue to the project through the maximum analysis year of 2042. The Optimistic Scenarios had the full development phasing in after only eight years after start-up of rail service (2024); Pessimistic Scenarios had the same 100% phase-in year of 2026 as the Most Likely Scenarios, but assumed a slower pace of initial development in the early years after rail reactivation. This slower phasing had some negative consequences for the cumulative wage and employment figures for the Pessimistic Scenarios.

The initial set of scenarios to be developed included freight and excursion rail developments, including freight impacts from Project Awesome, a proposed development in the vicinity of Marble (**Figure 6.7**, Excursion + Freight + Project Awesome).

Some additional scenarios were developed to answer specific questions about scale of impact from Project Awesome. One scenario was Project Awesome ONLY, which examined the impact of reactivating the A2M rail line between Andrews and Marble (resulting in a much lower capital and operating cost) without any excursion rail or any other freight development. This scenario also assumed that full freight development (related to Project Awesome) achieved full employment by 2021, five years after the assumed date of reactivation in 2016. Since there was no variability in either the excursion or background (not Project Awesome) freight figures, only a "Most Likely" scenario was developed (**Figure 6.7**, Project Awesome ONLY).

Another set of scenarios, which included Pessimistic and Optimistic scenarios, considered the impacts from rail reactivation if the Project Awesome development never occurred (although other new freight providers were assumed to come into existence after reactivation). Excursion rail was a part of this set of scenarios (**Figure 6.7**, Excursion + Freight w/o Project Awesome).

Figure 6.7 illustrates some of the variables used as input assumptions in the scenarios, as well as the resulting outputs from each of these scenarios. Both are discussed in the following pages.

Return On Investment Evaluation

Most of the information shown in **Figure 6.7** is annual totals of either inputs (number of rail cars of freight entering the A2M rail corridor) or outputs (the number of jobs in each year after the 2026 full development peak). Cumulative wages and cumulative jobs are actually totals from all years from project inception (2016) to the maximum allowable analysis year in TREDIS of 2042. The final two rows of **Figure 6.7** are benefit-cost ratios (where a 1:1 ratio means that \$1 of investment equals \$1 of economic benefit), both for travel-related benefits and total benefits including environmental and other, indirect impact categories.

The benefit-cost ratios range from a low of approximately 0.4 to a high of nearly 2.0 for the Optimistic Scenario where excursion and freight, including Project Awesome, are included. The Most Likely Scenario where Project Awesome and excursion rail service are both included reaches a benefit-cost ratio of 1.2. The price sensitivity of the TREDIS model, both in terms of capital and operating/maintenance costs, is in evidence in these various scenarios: where the cost is very low, such as the Project Awesome ONLY scenario, the benefit-cost ratio is higher even though the number of jobs added is lower. It is worth mentioning that decision-making only on the basis of a “good” benefit-cost ratio (e.g., anything greater than 1.0) is not advisable, since some of the bigger benefits to the community only occur in the more robust and inclusive scenarios.

In summary, it appears reactivation of the A2M rail line, inclusive of excursion and freight rail services, will spur between 1,200 to 1,900 annual jobs to Cherokee County and the surrounding area, although it may take a full ten years after operations begin to realize this level of employment benefits. These jobs will generate forecasted wages between \$37 million and \$64 million.

Additional revenues from taxes were not assessed in this analysis (forecasted through a process usually termed “fiscal impacts”) since they represent a redistribution rather than creation of revenues. However, these taxes would be substantial and important to the operation of local and state government entities. The job types range from typical service industries like food service and hotel workers, to railroad employees and people working in warehouses. Job numbers related just to the railroad activities are substantial, but the workers that provide support across a range of industry types are also important.

Creating a supportive environment may make the difference between an outcome characteristic of a “Most Likely” and an “Optimistic” scenario. The next section discusses how to optimize the development potential from the A2M rail reactivation.

Risks & Mitigation

Any analysis that attempts to forecast a specific economic outcome bears inherent uncertainty both in the analysis methodology as well as anticipating how various partners and markets will react to the proposal itself. The consultant team has provided a range of possible outcomes bracketed by pessimistic and optimistic scenarios to help clarify the outcomes from lower or higher levels of private business development; longer or shorter ramping up periods in reaction to the rail service; and a degree of sensitivity to the cost reductions that might be obtained through enhanced use of volunteers (the model for which in the comparative case studies is the Blue Ridge Rail Line). Based on the research conducted for this Project, the following actions could help maximize the potential benefits and minimize risks if they were taken after the rail line was completed.

» ***The role of local governments and economic development agency support is important to overall, long-term success of rail reactivation.***

The comparable cases that we studied indicated that government support for such services as parking provisions, facility maintenance, and development actions were invaluable, as were the joint marketing efforts conducted with area economic development agencies.

» ***Local advocacy, non-profit, and volunteer cooperation appears to range from somewhat important to absolutely critical (e.g., Blue Ridge Rail).***

Volunteers can and do provide services ranging from management to cleaning/maintenance to operations and marketing.

» ***The level of interest and support for rail reactivation is generally strong in the local community,*** at least as exhibited during local interviews and town hall-style meetings conducted for the Project. While some participants were concerned about impacts to private property, the great majority were supportive of the concept and the benefits of having rail service, from either tourism or freight (or both). ***This support is going to be crucial going forward,*** as there will be some who may strenuously object to reactivation of the rail service for various reasons.

» ***Partnerships with other businesses,*** particularly those that already attract tourists or have an existing marketing platform, ***are highly valuable to expand the reach of the rail organization marketing efforts.***

» ***One common theme shared by successful tourism rail lines is that they showcase the natural and cultural features along the rail corridor.*** While the panoramic views of the Andrews Valley are clearly a boon for fall excursions, another notable attraction is the area's rich cultural heritage. As discussed in other sections of this report, the rail corridor traverses the Trail of Tears National Historic Trail. It is also known that many Cherokee communities were located in the valley between Andrews and Murphy and that documented archaeology sites are prolific throughout the valley. The following (**Table 6.4**) are potential program elements and partnerships that could be pursued to develop a cultural heritage attraction and expanded to include cultural events and other attractions in downtown Murphy. This scenario draws on similar elements of other successful tourism rail programs and could be developed as one of a variety of excursions, including theme trains such as the Polar Express and Dinosaur Train.

Risks

- » **Permitting/cultural resources obstacles**
- » **Investment held hostage:** Operating contract and railroad becomes non-cooperative—careful negotiation of WIN-WIN contract to protect interest of all parties.
- » **Freight service obstacles:**
 - Tunnel expansion
 - Bridge replacement
 - GSMR/WATCO cooperation

Table 6.4 Potential Cultural Heritage Program Elements

POTENTIAL PROGRAM ELEMENT	PARTNERSHIP OPPORTUNITY
Fort Delany monument/ museum in Andrews	National Parks Service, State Historic Preservation Office, Downtown Andrews Historic Preservation Society, Chamber of Commerce
Tours of the Franklin Pierce Cover House	Residence owner, Downtown Andrews Historic Preservation Society, Chamber of Commerce
Outdoor drama at vacant parcel with siding or spur line	EBCI Unto These Hills, State Historic Preservation Office, National Park Service, Chamber of Commerce, Economic Development Commission, Grant Programs
A Cherokee “Valley Town” townhouse and museum at vacant parcel with siding or spur line	EBCI, State Historic Preservation Office, Chamber of Commerce, Economic Development Commission, Grant Programs
Tours of the George W. Hayes House	Residence owner, State Historic Preservation Office
Downtown Murphy festivals—car show, Heritage Festival, etc.	Chamber of Commerce, Economic Development Commission, Heritage Partners of Murphy, Valley River Arts Guild
Heritage Walk through Downtown Murphy to Cherokee County Historical Museum and along Riverwalk	Heritage Partners of Murphy, Chamber of Commerce, Economic Development Commission,
Cherokee County Historical Museum package	Cherokee County
Downtown Murphy B&B Overnight Package—could be timed with festivals or other events	Huntington Hall B&B, Valley River Arts Guild

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07 Environmental/ Cultural Assessment

SCREENING METHODOLOGY

This section includes a summary of environmental features along the rail line and a preliminary impact assessment.

The purpose of this environmental screening is to identify obvious constraints and environmental concerns with a focus on potential impacts requiring mitigation, permits, consultations, or other agency coordination.

This discussion is based on a desktop review of available data and aerial photography. As the project moves forward, field investigations will be necessary to determine the presence of protected species habitat, jurisdictional streams and wetlands, hazardous materials sites, or any other notable features.

In addition to online databases, this environmental screening also references the ***Determination of National Register Eligibility Report for the Murphy Branch Linear Historic District.***¹

¹Mattson, Alexander and Associates, Inc. April 2014. *Determination of National Register Eligibility Report for the Murphy Branch Linear Historic District. Western North Carolina Railroad-Southern Railway. Andrews-To-Murphy Segment. Murphy Branch Reactivation Project. Cherokee County, North Carolina. WBS No. 42891. Rail Division Fiscal No. 14-PI-001*

In order to host modern day rail loadings, certain structures or rail infrastructure will need to be repaired or upgraded, as addressed in chapter ***05 Rail Line Infrastructure Needs*** of this report. The preliminary impact assessment is based on the proposed actions listed below.



Summary of Repairs

(needed to restore rail service):

- » Railroad embankment stabilization including minor grading and erosion control measures (approximately one-third of the track length)
- » Tie replacement and track resurfacing, including ballast placement, tamping, and finish grading
- » Rail replacement (approximately one-tenth of track length at various locations)
- » Track re-construction at Murphy Yard
- » Turnout replacement (5) and removal (10)
- » At-grade crossing repairs (61)
 - Resurfacing, pavement marking, crossbucks, advanced warning signs (34)
 - Resurfacing and private crossing signage (26)
 - Resurfacing, reconstruct flashers, add pavement markings, and advanced warning signs (1)
 - Remove out-of-service at-grade road crossings
- » Culvert maintenance/repair (22)
 - Rip-rap placement (1)
 - Culvert replacement 24-inch corrugated metal pipe (9)
 - Culvert replacement with 36-inch corrugated metal pipe (2)
 - Debris removal (10)
- » Railroad Signage repairs: i.e. whistle posts, and mile markers
- » Replacement of 175-foot timber trestle bridge (MP 110.70) with deck plate girder steel bridge (1)

²Detailed evaluation of these preliminary estimates and final determinations will be conducted by NCDOT Rail Division, Engineering Safety Group.

³Although factored into the economic model, these infrastructure improvements were not evaluated in the environmental screening. Specific improvements will be identified in subsequent studies and will be planned in areas of existing development that are unlikely to present environmental challenges

- » Replacement of main span of Pratt Truss (MP 113.80) over the Valley River with deck plate girder steel bridge (1) and repair approach spans on each end
- » Timber bridge repair (5)
- » Steel bridge repair (1)
- » Steel and Timber bridge repair (2)

Summary of Improvements

(recommended to enhance railroad safety and operations):

- » At-grade crossing improvements (11)²
 - Crossing Protection Automatic Gates (1)
 - Crossing Protection Warning Flashers (10)
- » Depot improvements in Murphy & Andrews³
 - Restoration/repairs
 - Parking improvements
 - Enhancements (sidewalks, bathrooms, shuttle)



AFFECTED ENVIRONMENT

This section focuses on environmental resources along the rail corridor and the potential for direct impacts to these resources.

⁴NC Division of Water Quality. December 2013. *Best Usage Classifications*. <http://portal.ncdenr.org/web/wq/ps/cs/classifications>

⁵NC Division of Water Quality. February 2014. *2014 Draft Category 5 Water Quality Assessments-303(d) List*. <http://portal.ncdenr.org/web/wq/ps/mtu/assessment>

⁶Hiawasse River Watershed Coalition Inc. <http://www.hrwc.net/valley.htm>

⁷Valley River restoration puts trout tourism on table. *Andrews Journal*. August 11, 2010.

⁸North Carolina Natural Heritage Program Online Map Viewer. <http://www.ncnhp.org/web/nhp/nhp-map-viewer>

For the purposes of this study, the rail corridor is defined as extending roughly 25 feet on either side of the track centerline. See **Figure 7.1**, Environmental Features Map, which highlights the location of several key elements. A summary of potential impacts and subsequent actions is contained in **Table 7.2**.

NATURAL ENVIRONMENT

STREAMS There are 57 stream crossings along the rail corridor between Andrews and Murphy. Most of these waterbodies are classified by the NC Division of Water Quality (NCDWQ) as Class “C” waters, which are suitable for secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, and agriculture. Most streams in the Valley River watershed, including Welch Mill Creek, Thresh Creek, Morris Creek, and the Valley River have a supplemental designation as Trout waters (Tr).⁴ A 10.9-mile section of the Valley River is identified as a Section 303(d) impaired waterbody due to turbidity and fecal coliform levels.⁵

Restoration efforts spearheaded by the Hiawasse River Watershed Coalition have focused on this impaired portion of the Valley River. Stream restoration efforts include stabilization and enhancement projects along 13,250 linear feet of the Valley River and 1,550 linear feet along its tributaries.⁶ Local press indicates trout fishing is a potential tourism opportunity for the area and that Cherokee County would like to pursue [additional] stream restoration efforts to reduce turbidity and improve stream habitat.⁷ In addition, the NC Natural Heritage Program identifies the Valley River and its tributaries as significant aquatic habitat.⁸

Figure 7.1 Andrews to Murphy Rail Reactivation Study Environmental Features Map, Cherokee County, NC, Section I

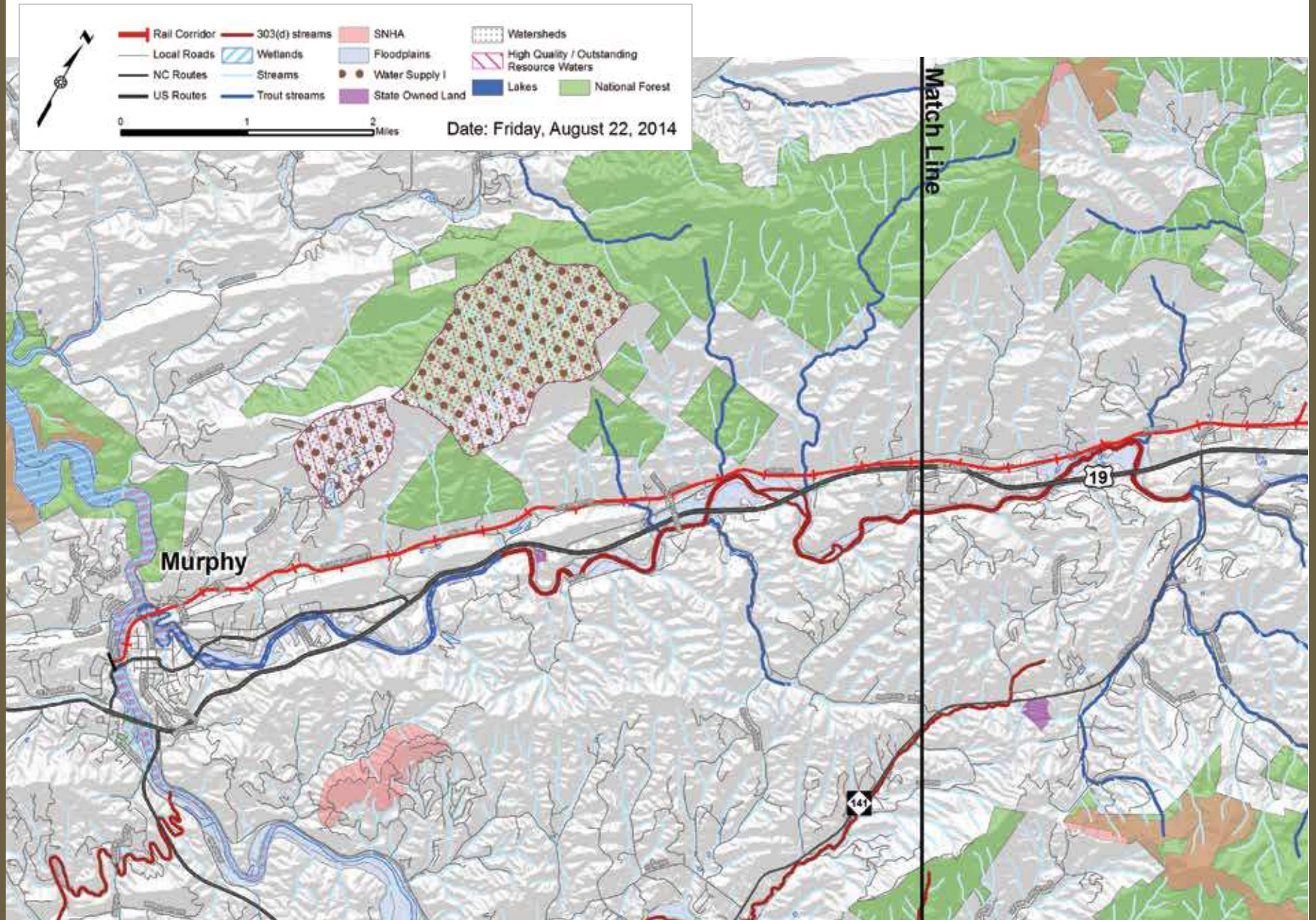
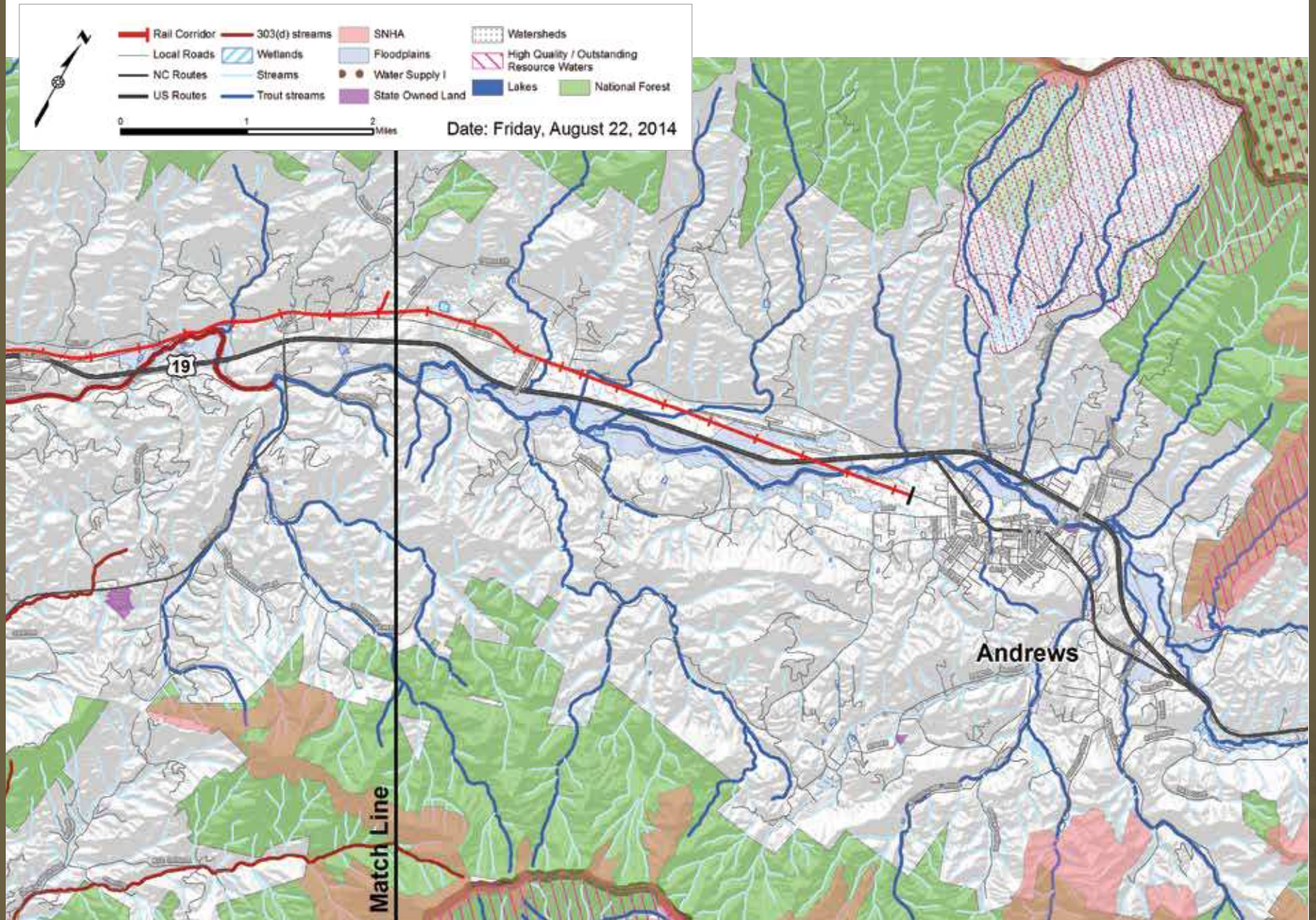


Figure 7.1 Andrews to Murphy Rail Reactivation Study Environmental Features Map, Cherokee County, NC, Section 2



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WETLANDS National Wetlands Inventory (NWI) mapping indicates the presence of wetland systems in the forested area near the confluence of the Valley River and Hiwassee River just west of Murphy but does not identify any additional wetland locations.⁹ Although wetlands are most commonly found in low-lying areas, it is evident that the high amount of agricultural use along the rail corridor has altered natural hydrologic regimes and prohibited the establishment of wetlands.

PROTECTED SPECIES Table 7.1 shows the federally-protected species for Cherokee County.¹⁰ Preliminary assessments indicate that it is likely that there will be no suitable habitat for protected species within the rail corridor. Generally speaking, turbidity has made many valley streams unsuitable habitat for protected mussel species, while the other protected species occur in different habitat than that present along the rail corridor.

FLOODPLAINS Approximately 8,500 linear feet of the rail corridor crosses the Valley River or its associated floodplains, primarily through the broad agricultural lands that flank the river and its tributaries. In most locations, the rail line is on embankments several feet above floodplain elevations. Bridges and culverts along the rail line allow floodwaters to access bisected portions of the floodplain.

Table 7.1 Federally Protected Species of Cherokee County

COMMON NAME	SCIENTIFIC NAME	DESIGNATION
Bald eagle	<i>Haliaeetus leucocephalus</i>	BGPA
Bog turtle	<i>Clemmys muhlenbergii</i>	T (S/A)
Indiana bat	<i>Myotis sodalis</i>	E
Northern long-eared bat	<i>Myotis septentrionalis</i>	P
Sicklefin redbhorse	<i>Moxostoma</i> sp. I	C
Cumberland bean (pearlymussel)	<i>Villosa trabalis</i>	E
Little-wing pearlymussel	<i>Pegias fabula</i>	E
Tan riffleshell	<i>Epioblasma florentina walkeri</i> (=E. walkeri)	E
Small whorled pogonia	<i>Isotria medeoloides</i>	T
White fringless orchid	<i>Platanthera integrilabia</i>	C

SOURCE: US Fish and Wildlife Service, January 2014.
<http://www.fws.gov/raleigh/species/cntylist/cherokee.html>

NOTES:

E = endangered. A taxon "in danger of extinction throughout all or a significant portion of its range."

T = threatened. A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

C = candidate. A taxon under consideration for official listing for which there is sufficient information to support listing. (Formerly "CI" candidate species.)

BGPA = Bald and Golden Eagle Protection Act.

The Act prohibits take of bald and golden eagles and provides a statutory definition of "take" that includes "disturb".

T(S/A) = threatened due to similarity of appearance. A taxon that is threatened due to similarity of appearance with another listed species and is listed for its protection. Taxa listed as T(S/A) are not biologically endangered or threatened and are not subject to Section 7 consultation.

P = proposed. Taxa proposed for official listing as endangered or threatened will be noted as "PE" or "PT", respectively.

⁹US Fish and Wildlife Service. National Wetland Inventory Wetland Mapper.
<http://www.fws.gov/wetlands/data/Mapper.html>

¹⁰US Fish and Wildlife Service. January 2014.
<http://www.fws.gov/raleigh/species/cntylist/cherokee.html>

HUMAN ENVIRONMENT

HISTORIC STRUCTURES The Murphy Branch Linear Historic District, WNCRR-Southern Railway, is considered eligible for listing on the National Register of Historic Places under Criterion A for transportation and Criterion C for engineering and design. The proposed district retains aspects of integrity needed for eligibility, including its location and setting. With its intact rail corridor and notable historic resources related to the operation of the line, the rail line retains its integrity of design, materials, and workmanship. It contains well-preserved historic bridges and trestles, notably the 1890s, pin-connected, Pratt through-truss span over the Valley River just north of Murphy and the 1940, reinforced concrete, tee beam highway overpass (Tennessee Street, Bridge No. 190222), determined eligible for the National Register in 2005. The line's smaller, wooden trestles as well as stone and concrete arched culverts illustrate common types used by railroads during the late nineteenth and early twentieth centuries for smaller crossings.

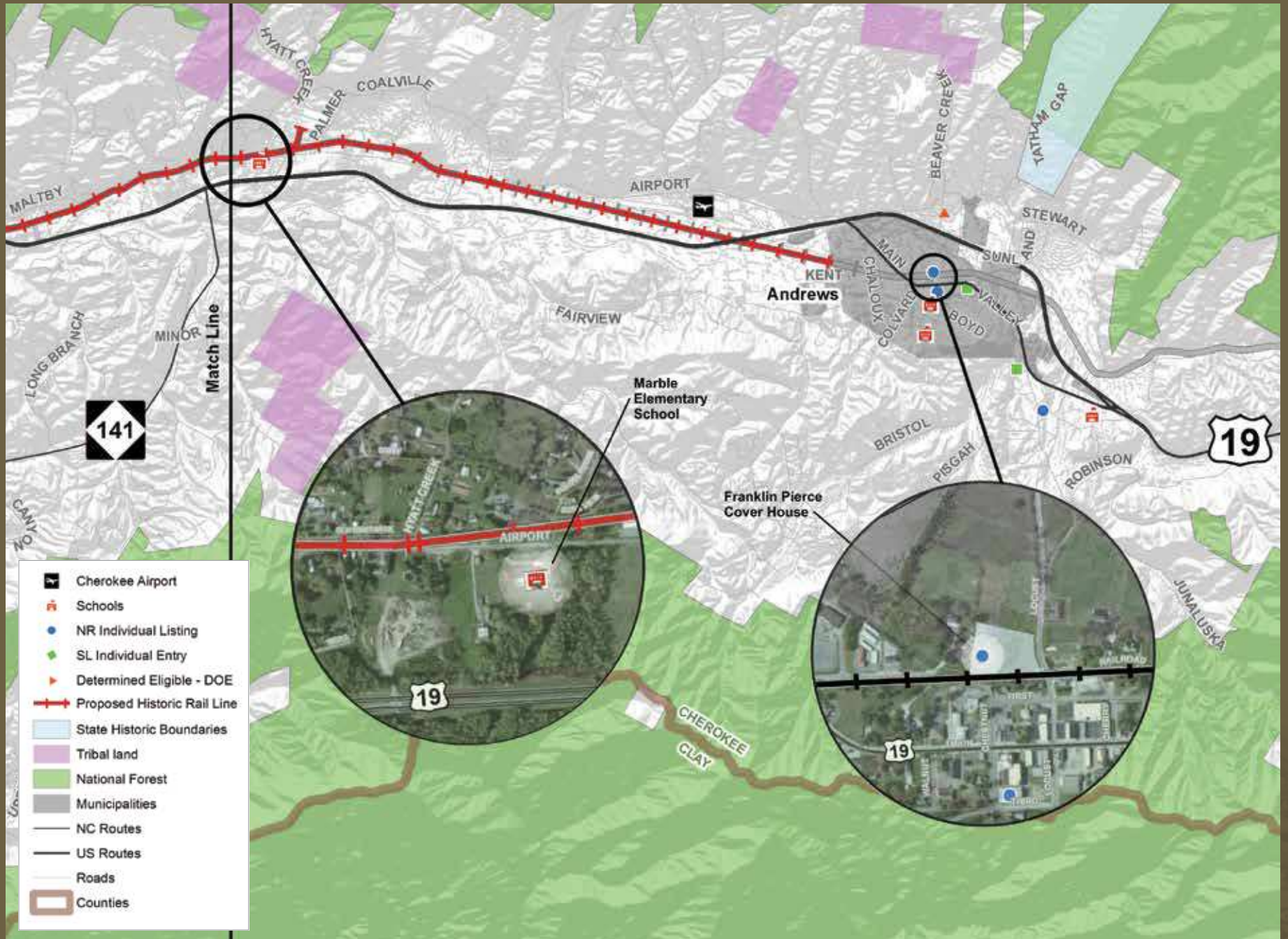
Along most of the rail line, the historic boundary proposed in the *Determination of National Register Eligibility Report for the Murphy Branch Linear Historic District*¹ extends approximately twenty feet on either side of the track center line to encompass the tracks, ballast, and construction contours. In some locations, the proposed boundaries extend beyond these limits to encompass contributing historic resources, such as bridges, additional tracks, and other features along the railway that were associated with the operation of the line. The proposed historic district boundary at the western terminus includes the parcels on which the former rail yard and adjoining boarding house for railroad workers are located. The eastern boundary of the proposed historic district is just west of the Andrews depot, approximately one mile east of the reactivation study project limits. The modern Andrews railroad depot, a one-story, frame building erected in 1989 by the Great Smoky Mountains Railroad, is excluded from the historic district boundary.

In summary, the proposed National Register boundary encompasses the following contributing resources: 1) Rail Corridor between the depot site in Andrews to the branch terminus in Murphy; 2) Pratt Truss Bridge (1890s) over the Valley River; 3) Bridge No. 190222, a 1940, reinforced-concrete, tee beam overpass that carries two-lane Joe Brown Highway over the railroad corridor; 4) Ten trestle and plate girder bridges; 5) Culverts; 6) Whistle Post Signs; 7) Mile Post Signs; 8) Switches; and 9) Boarding House (1920s) in Murphy (currently under private ownership).

While a number of structures near the rail corridor have been surveyed by the State Historic Preservation Office (SHPO), no properties listed on the National Register of Historic Places are within the rail corridor. The Franklin Pierce Cover House is located along Railroad Street in Andrews, as shown in **Figure 7.2**, Community Features Map; however, this property is outside the project limits of this reactivation study.



Figure 7.2, Community Features Map, Section 2



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The preliminary report has been reviewed by the North Carolina Department of Cultural Resources, State Historic Preservation Office (SHPO). In a letter dated October 16, 2014, the SHPO office provided a letter of concurrence that the Murphy branch is eligible for listing in the National Register of Historic Places under Criteria A and C. Continued coordination with SHPO will be required as the project progresses.

CULTURAL HERITAGE The southwestern portion of North Carolina is part of the ancestral Cherokee Nation and as such, many archaeological sites have been documented in the region. Although the SHPO online database does not show the locations of recorded archaeological sites, it is well known that Cherokee settlements were prolific within the Valley River area. The 1977 archaeological survey conducted for the proposed US 19 between Andrews and Murphy produced a total of 23 archaeological sites along the roadway corridor.¹¹

In the early 1800's, government officials began disputes with the Cherokee Indians over land ownership and in 1838, approximately 15,000 Cherokee Indians were forcibly removed from their lands and marched through deep snow and extreme cold to Oklahoma. The route that the dispossessed Cherokees followed became known as "The Trail of Tears" which is now a National Historic Trail, administered by the National Park Service (NPS). Its exact location in North Carolina is not available through NPS online resources; however, the Trail of Tears National Historic Trail is broadly defined as traversing the valley between Andrews and Murphy, running concurrently with the rail corridor as it enters the Murphy area.¹²

¹¹ SSI Earth Services Division. 1980. *Archaeological Survey and Evaluation of Proposed US 19 from Andrews Bypass to NC 28. Cherokee, Graham, and Swain Counties, North Carolina. State Project Nos. A-8 and A-9.*

¹² National Park Service. *Trail of Tears National Historic Trail website.* <http://www.nps.gov/trte/index.htm> Accessed June 18, 2014.

FARMLANDS Most of the rail corridor is flanked by active farmland. In 1995, Cherokee County Commissioners authorized the development of voluntary agricultural districts (VADs) to encourage the preservation and protection of farmland. No VADs have been established to date, although the County is in the process of developing a Farmland Protection Plan that will establish practices that will protect and preserve farmland soils.

SCHOOLS Three Cherokee County public schools are located in the Andrews area; none of these schools are adjacent to the rail corridor. Marble Elementary is located outside the rail corridor along the south side of Airport Road in Marble. In Murphy, there are three public schools and one charter school; only the charter school is within close proximity to the rail corridor.

The Learning Center Charter School is located within the southeast quadrant of the at-grade rail crossing at Mile Post 114 on Connahetta Street (SR 1424) in Murphy. School enrollment is approximately 200 students in grades K-8. The school's director indicates that there is pedestrian activity in the area and has also expressed concerns about train speeds through the crossing. As noted in **Table 7.2**, recommendations include a fence along the school's property line as an added safety measure.

ANTICIPATED EFFECTS AND MITIGATION/ PERMITTING REQUIREMENTS

Table 7.2 summarizes potential direct impacts associated with repairs and improvements along the rail corridor. As previously stated, this preliminary assessment is based on a desktop review of available data to identify constraints and considerations moving forward. Field investigations and additional data-gathering would be required to comply with National Environmental Policy Act (NEPA) regulations.

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Table 7.2

NOTABLE FEATURE	POTENTIAL IMPACT-CAUSING ACTIVITIES	POTENTIAL IMPACTS	MITIGATION/CONSULTATIONS/PERMITS
<p>Streams</p> <ul style="list-style-type: none"> » Trout streams » Impaired waters 	<ul style="list-style-type: none"> » Culvert repair » Culvert replacement » Bridge replacement » Bridge repair » Track reconstruction at Murphy yard 	<p>Likely impacts include the potential for erosion and increased sedimentation associated with land-disturbing activities.</p>	<p>It is likely that the most protective sediment and erosion control best management practices (BMPs) will be required during construction as detailed in 15A NCAC 4B .0124 (Design Standards in Sensitive Watersheds).</p> <p>Coordination should be initiated with the NC Wildlife Resources Commission to determine whether a construction moratorium will be required during anadromous fish spawning seasons.</p> <p>Coordination should be initiated with the US Army Corps of Engineers and Tennessee Valley Authority to determine permit needs for the proposed timber bridge and culvert replacements.</p>
<p>Wetlands</p>	<ul style="list-style-type: none"> » Embankment grading 	<p>Wetland impacts are not likely due to the significant amount of agricultural use along the rail corridor. Agricultural practices have altered natural hydrologic regimes and prohibited the persistence of wetlands.</p>	<p>If wetland impacts are anticipated based on field surveys, avoidance/minimization measures should be employed and permits pursued in accordance with Sections 404 and 401 regulations.</p>
<p>Protected species</p>	<ul style="list-style-type: none"> » Embankment grading » Culvert repair » Culvert replacement » Bridge replacement » Bridge repair 	<p>Preliminary investigations indicate that suitable protected species habitat will not be found within the rail corridor.</p>	<p>Coordination should be initiated with the US Fish and Wildlife Service and the NC Natural Heritage Program.</p> <p>If field surveys determine the presence of suitable habitat, informal consultation should be initiated with the US Fish and Wildlife Service.</p>
<p>Floodplains</p>	<ul style="list-style-type: none"> » Embankment grading » Culvert repair » Track construction at Murphy yard 	<p>The placement of fill has the potential to affect floodplains; however, given the relatively minor amount of earthwork proposed, no alterations to flood elevations are anticipated.</p>	<p>Coordination with the NCDOT Hydraulics Unit, FEMA, and local authorities should be conducted to ensure compliance with applicable floodplain management ordinances.</p>
<p>Historic structures</p>	<ul style="list-style-type: none"> » Tie/rail replacement » Turnout replacement » At-grade crossing repairs/improvements » Culvert maintenance/repair » Signage repairs » Bridge repair/replacement 	<p>The replacement of the Pratt Truss and timber trestle bridges may result in an “adverse effect” determination by the SHPO.</p> <p>Other proposed activities are not likely to have an adverse effect on historic structures.</p>	<p>SHPO should be provided the recently-prepared <i>Determination of Eligibility Report</i>¹ and Section 106 consultation should be initiated to assess the feasibility of certain project elements, in particular the proposed timber trestle bridge replacement.</p>

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Table 7.2 continued

NOTABLE FEATURE	POTENTIAL IMPACT-CAUSING ACTIVITIES	POTENTIAL IMPACTS	MITIGATION/CONSULTATIONS/PERMITS
Cultural Heritage	<ul style="list-style-type: none"> » Embankment grading » Culvert repair 	Land-disturbing activities have the potential to affect archaeological sites and the Trail of Tears National Historic Trail.	<p>Coordination should be initiated with the State Office of Archaeology and the Eastern Band of Cherokee Indians (EBCI) Tribal Preservation Officer (THPO).</p> <p>Coordination efforts should address the potential for impacts to the Trail of Tears National Historic Trail and any associated regulatory requirements. Because this portion of the Trail does not traverse any publicly-owned lands, impacts would not be subject to Section 4(f) regulations as they apply for the proposed use of a trail or path. However, if trail segments or sites are found to be of historical significance and eligible for listing on the National Register of Historic Places, then these locations are subject to Section 4(f) requirements.¹³</p>
Farmlands	<ul style="list-style-type: none"> » Embankment grading 	The placement of fill has the potential to affect farmlands; however, given the limited amount of earthwork proposed, impacts to farmlands would be very minor, if any.	Impacts to farmlands should be assessed in accordance with the Farmland Protection Policy Act (FPPA).
Schools	<ul style="list-style-type: none"> » Reactivation of the rail line 	<p>Learning Center staff expressed concern regarding train speed and general safety issues associated with reactivation of the rail line.</p> <p>The crossing's proximity to the Murphy depot and the curve in the rail line will slow train speeds through this area.</p>	<p>Fencing should be constructed along the school property line to prevent students and area pedestrians from accessing the rail corridor. A permanent speed restriction of 10 miles per hour should be considered for this crossing.</p> <p>The Cherokee County Comprehensive Transportation Plan¹⁴ recommends that the sidewalk on the south side of Connahetta Street (SR 1424) be continued across the tracks. Crossing improvements at this location could include the construction of pedestrian facilities.</p>

NOTES: There are no Outstanding Resource Waters (ORWs), High Quality Waters (HQWs), or water supply (WS) watersheds within the rail corridor. Desktop review did not indicate the presence of tribal lands or parks/recreational areas along the rail corridor.

¹³Federal Highway Administration. July 2012. Section 4(f) Policy Paper. <http://www.environment.fhwa.dot.gov/4f/4fpolicy.asp>

¹⁴NC DOT. 2013. Cherokee County Comprehensive Transportation Plan. https://connect.ncdot.gov/projects/planning/Pages/CTP-Details.aspx?study_id=Cherokee%20County

PHASE II SCOPE OF SERVICES

Future planning and design work for the advancement of this project should include:

1. A project **scoping letter** to initiate coordination with regulatory and resource agencies, including:
 - US Army Corps of Engineers
 - US Fish and Wildlife Service
 - National Park Service
 - Eastern Band of Cherokee Indians (EBCI) Tribal Historic Preservation Officer
 - Tennessee Valley Authority
 - State Historic Preservation Office
 - NC Division of Water Quality
 - NC Natural Heritage Program
 - NC Wildlife Resources Commission
2. **Field surveys** to delineate **jurisdictional streams/wetlands**, conduct surveys for protected species occurrences and habitat, and document notable community features.
3. **Conceptual or preliminary design of proposed repairs and improvements**
4. A preliminary impact assessment and **environmental documentation** under the **National Environmental Policy Act**. The proposed project would likely require a Programmatic Categorical Exclusion (PCE), a Categorical Exclusion (CE), or Environmental Assessment (EA) depending on project elements and design as well as input received during project scoping. The project as proposed is likely to require additional coordination under Section 106 of the National Historic Preservation Act. Document approval times range, depending on the proposed actions, level of documentation, and number of reviews.

Agency responses to the project scoping letter will help shape certain elements of the project and determine next steps with regard to regulatory compliance.

5. **Permits and Consultations**, some of which can be obtained before the approved environmental document; others may require the environmental document's approval prior to issuing permits. Based on the proposed improvements, it is likely that the following permits and consultations will be required:
- USACE Preconstruction Notification (PCN)
 - USACE Nationwide Permit (NWP) for bridge and culvert replacement/repair
 - TVA Section 26a Permit for bridge and culvert replacement and repair
 - Navigable Waterways Permit (under Section 10 of the Rivers and Harbors Act, administered by the USACE) for bridge replacement
 - Section 106 Consultation with SHPO regarding impacts to infrastructure within the proposed linear historic district encompassing the rail corridor
 - Section 4(f) Evaluation for the replacement of historic bridges

In addition to permits and consultations, future compliance-related activities include, but are not limited to:

- » Coordination with the NCDOT Hydraulics Unit, FEMA, and local authorities to ensure compliance with applicable floodplain management ordinances
- » Impacts to farmlands should be assessed in accordance with the Farmland Protection Policy Act (FPPA)
- » If wetland impacts are anticipated based on field surveys, avoidance/minimization measures should be employed and USACE/NCDWQ permits pursued in accordance with Sections 404 and 401 regulations
- » If field surveys determine the presence of suitable habitat, informal consultation should be initiated with the US Fish and Wildlife Service
- » Development of an Erosion & Sedimentation Control Plan in coordination with NCDWQ

PROJECT SCHEDULE

As noted in previous paragraphs, there are a number of considerations that are likely to require permits or consultations, most notably historic resources (SHPO consultation) and the proposed bridge replacement (TVA permit).

The Phase II services outlined above would require, at minimum, one year to complete; however, this is a best case scenario with an expeditious permitting and consultation process. In all likelihood, the environmental review and regulatory compliance processes would extend past a year, possibly up to two years from commencing Phase II work. In addition, the project's construction schedule would be affected if it is determined that a construction moratorium would be required for bridge and culvert work.

The schedule for field surveys, impact assessment and environmental documentation preparation can be developed independent of coordination requirements; however, the project's environmental review and compliance components do have the potential to extend the project schedule. The following bullets outline next steps for the proposed reactivation with critical path items shown in bold.

- » Conduct desktop database investigations and field surveys to delineate streams/wetlands and conduct surveys for protected species (no T&E are anticipated)
- » Finalize proposed designs and assess impacts
- » Prepare environmental document (PCE, CE, or EA)
- » Submit environmental document for state (NCDOT) and federal review (Federal partner to be determined by funding source)
- » Prepare and submit Preconstruction Notice and US Army Corps of Engineers (USACE), NC Division of Water Quality (NCDWQ), and Tennessee Valley Authority (TVA) permit packages
- » **Receive federal agency comments on environmental document** (a minimum of one month; two months is more likely)
- » **Address federal agency comments and resubmit environmental document for signatures** (this element could include a couple iterations with agencies, taking upward of four to five months)
- » **Receive USACE and NCDWQ permits/approval** (two months after submittal or two months after receipt of any requested supplemental data)
- » **Receive TVA permit** (typically four to six months after submittal)

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08 Recommendations & Conclusions



FINDINGS AND CONCLUSIONS

The western North Carolina region is changing.

New development initiatives are being paired with public/private services such as recreation, retirement living, business incubators and infrastructure improvements to create an air of excitement and opportunity. The communities of western North Carolina are building on the established momentum in the region. To continue attracting economic development and expanding transportation choices, the communities in partnership with NCDOT need to be proactive when addressing needs and issues. The success of reactivating the Murphy to Andrews rail line relies in part on how well local and regional officials and leaders collaborate. This chapter summarizes the outcome and recommendations related to reactivating the Andrews to Murphy rail line. The highest priority initiatives developed as part of the study are summarized in this chapter along with key projects, costs and timeline. It will be up to NCDOT as well as local and regional decision-makers to identify the most desirable recommendations for implementation.

Successful regional planning requires coordination across all levels of government to ensure that regional initiatives serve as the basis for future action. Although this study set forth the justification for reactivating rail service, and identifies specific key projects and recommendations, it is not without understanding the larger framework of regionalism. Several regional initiatives should continue to build on the analyses and recommendations set forth in this study. These initiatives are described as they pertain to promoting rail service within the western North Carolina region.

SUMMARY OF ANALYSIS

The evaluation of the Andrews to Murphy rail corridor was completed to provide an independent assessment of the feasibility of reconstituting rail service to Cherokee County. Several factors and contextual elements were developed as a part of this evaluation including:

- » Overview of the history and need of rail service
- » Establishment of study objectives, assumptions and analysis criteria
- » Gathering input from stakeholders
- » Railroad Corridor Infrastructure Evaluation
 - Detailed inspection of the railroad facilities (track, bridges, crossings, culverts, etc.)
 - Develop detailed repairs, improvements and associated costs
 - Evaluate railroad operations
- » Evaluate Market and Investment Viability
 - Stakeholder interviews
 - Comparative case studies
 - Economic modeling
 - Economic development potential
 - Return on Investment (ROI)
 - Risks and Mitigations
- » Environmental/Cultural Assessment

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RAIL FEASIBILITY AND CONSIDERATIONS

When balancing the trade-offs associated with making significant infrastructure improvements, decision-makers must consider the financial ramifications of that decision. Key quantitative factors used in this evaluation included cost of infrastructure, cost of services, economic development potential, job creation, and cost-savings of transport. However, qualitative factors must be well vetted and understood as well. Through discussions with local and regional stakeholders, there appears to be tremendous local interest in reconstituting rail service in Cherokee County. Many issues were identified by these constituents. Stakeholders were quick to address that the region is somewhat economically depressed.

Freight rail service is believed to be a key factor to economic development. There is good potential for extension of tourism rail with the new casino under construction. The outcome of this analysis indicates that local passenger is possible, but many hurdles exist including uncertainties regarding ridership.

Interest at the State level is more pragmatic. From a State perspective there is a desire to make use of this out-of-service asset, if proven cost-effective. The return on investment (ROI) must be financially feasible. Risks must be evaluated and reasonably mitigated. A strategy for long term operation must be in place and supported by the western region. This does not preclude the sale of the rail corridor itself.

The state of infrastructure assessment indicated that the rail line is in reasonable condition. NCDOT Rail

Division has provided the minimal maintenance of the tracks required to keep the corridor intact. However, repairs will be required to embankment, track, bridges (two replacements), culverts, crossings, and local facilities (depots, parking, etc.). In addition, improvements are needed to improve crossing safety and facilitate freight service operations.

The market need and investment viability analysis provided a wealth of information to be used in this decision process. **Reconstituting rail service is likely to spur both industrial and commercial**

development, depending on the type of rail service(s) provided. Existing facilities (Baker Furniture and Coats American) have good potential for reuse. Extension of tourism rail service would complement existing tourism and casino development. **Based on the economic modeling (using TREDIS software), there appears to be a good potential for economic development and redevelopment. Return on investment numbers indicate a benefit to cost ratio varying from less than 1:1 to nearly 2:1, for transportation related benefits. Annual wages on the order of \$60 million stemming from nearly 1,900 jobs are forecasted after the full**

development potential attached to the A2M project would be realized (assumed to be 10 years after completion of the rail reactivation). This provides a ROI for employment/wage benefits of greater than 3:1. While some of these benefits are associated directly with rail operations, ancillary development prospects account for the majority of wage earnings and jobs.

Stakeholders were quick to address that the region is somewhat economically depressed.

The environmental and cultural assessment was based on the assumption that the majority of impacts are related to the repair and improvements to existing infrastructure. Sensitive streams, protected species, historic structures, cultural heritage are issues of concern that must be addressed prior to any rail or depot improvements. There are a number of environmental features along the rail line, most notably streams and historic resources. Field investigations and additional data-gathering would be required to assess potential impacts and comply with National Environmental Policy Act (NEPA) regulations. Also, coordination with state and federal regulatory agencies will be required to determine final permit and consultation needs and identify mitigation measures, if necessary.

Risk and mitigation issues also were identified and considered. It is expected that any level of reconstituting rail service will require some level of permitting, requiring a specific time or duration and funding commitment. Future rail service must safeguard against the investment being held hostage. This will require carefully drafted agreements with operating railroad to ensure owner maintains adequate control and has a cease and desist clause. Freight service will also depend on tunnel and bridge capacity and shipping rates (via GSMR & BLU).

Annual wages on the order of \$60 million stemming from nearly 1,900 jobs are forecasted.

Project capital costs were identified at three different levels including minimum repairs, advanced improvements and enhancements to local depots and surrounding infrastructure. Railroad repairs are the minimum necessary to reestablish safe railroad operations. Improvements will provide enhancements to crossing safety and railroad operations (primarily focused on meeting increased freight operating needs for new industries). A breakdown of each for the ultimate build-out scenario¹ is shown below.

Project Costs

- » Railroad Repairs (reestablish Class 1/Class 2 service) . \$10.3 million
- » Railroad Improvements (Siding) \$1.0 million
- » Railroad Improvements (crossing warning devices) \$2.9 million
- » GSMR Railroad Repairs \$2.2 million
- » Project Design/Construction Engineering & Inspection . . \$1.0 million
- » **TOTAL PROJECT COST \$17.4 million**

Local Infrastructure Costs (by others)

- » Andrews Depot Enhancements (Capital Cost) \$2 million
- » Murphy Depot Enhancements (Capital Cost) \$3 million
- » **TOTAL LOCAL INFRASTRUCTURE COST \$5 million**

¹ Costs for other scenarios are shown in Table 5.6 on page 53.

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ACTION MATRIX

Development (and costs) can be phased to meet the need for rail service. Potential phasing is shown in the table below.

Table 8.1

TASK DESCRIPTION	TIMEFRAME	REPAIR COSTS	PRIMARY RESPONSIBILITY
Corridor Repairs: Andrews to Coats American (MP 100.1 - 104.6)	2015 (Q1-Q2)	\$1,800,000	NCDOT Rail Division
Corridor Repairs: Coats American to Wood Processing (MP 104.6 - 108.1)	2015-2016	\$1,500,000	NCDOT Rail Division
Corridor Repairs: Wood Processing Plant to Connahetta St. (MP 108.1 - 113.5)	2015-2016	\$4,100,000	NCDOT Rail Division
Corridor Repairs: Connahetta St. to Murphy Depot (MP 113.5 - 114.2)	2015-2016	\$2,900,000	NCDOT Rail Division
Subtotal: Rail Corridor Repairs		\$10,300,000	
Andrews Depot Infrastructure Improvements	2015-2016	\$2,000,000	Town of Andrews
Murphy Depot Infrastructure Improvements	2015-2016	\$3,000,000	Town of Murphy
Subtotal: Local Infrastructure Improvements		\$5,000,000	
Total Costs		\$15,300,000	

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Decision-makers, both public and private can use the findings of this study to support the reactivation of this important rail asset.

CONCLUSION

The findings contained in this report indicate that reactivating the Andrews to Murphy rail line to provide freight and tourism rail service would provide an economic boost to Cherokee County and should be considered along with other rail priorities in North Carolina. Our findings indicate that the railroad is in fair condition, repair costs and environmental considerations are reasonable, local interest tourism potential is high, economic development potential is very promising, and return on investment is reasonable.

In fact, the results of this detailed economic analysis indicate a boost to the regional economy of approximately \$60 million and the addition of nearly 1900 jobs over the next 15 years. ***This will provide a wage related Benefit-Cost Ratio of greater than 3:1.*** These estimates include the cost of upgrading the railroad infrastructure (track, bridges, crossings, etc.) and address the broad-based economic benefit to the region as a whole.

This report provides clear support and justification for reactivating the Andrews to Murphy rail line. Decision-makers, both public and private can use the findings of this study to support the reactivation of this important rail asset.

Appendix

Andrews to Murphy (A2M) Rail Reactivation Study Opinion of Construction Costs

RECOMMENDED TRACK & BRIDGE REPAIRS						
Item #	Description	Unit	Unit Price	Quantity	Amount	Comments
1	Earthwork	CY	\$ 8	10,764	\$ 86,113	Earthwork to establish railroad embankment: 1' x 24' (0.44 CY / TF). Assume 1/3 of track length will need immediate embankment improvement.
2	Tie Replacement (1700 / mile)	EA	\$ 100	23,630	\$ 2,363,000	Includes track resurfacing (ballast placement, tamping, finish grading). Estimate based on tie inspections April 1-2, 2014.
3	Rail Replacement (33 ft. rails)	EA	\$ 750	445	\$ 333,600	Assume 10% rail replacement to reconstitute rail line (scrap rail)
4	Track Construction (Murphy Yard)	TF	\$ 125	5,000	\$ 625,000	Assume track south of Valley River will be refurbished: main track (3000 TF) and siding (2000 TF)
5	Turnouts				\$ 425,000	Per detail on Turnouts sheet
6	Crossings				\$ 494,050	Per detail on Crossings sheet
7	Culverts				\$ 109,500	Per detail on Culverts sheet
8	Railroad Signage	MI	\$ 2,000	14.2	\$ 28,400	Includes cross bucks, early warning signs, pavement marking, whistle posts, mile markers, etc.
9	Bridges (Replacement)				\$ 3,190,860	Recommend replacement of BR 110.70 & BR 113.8 Main Span with Deck Plate Girder Steel Bridges - Per detail on separate sheet
10	Bridges (Timber Repair)				\$ 464,085	Per detail on Bridge sheets
11	Bridges (Steel Repair)				\$ 291,270	Per detail on Bridge sheets
12	Embankment Stabilization	LS	\$ 100,000	1	\$ 100,000	Required for embankment stabilization along roadways and streams. Assume placement of crusher run stone with Gradall: one month work.
13	Rail OTM (misc. locations)	MI	\$ 3,000	14	\$ 42,000	
Track Repair Subtotal:					\$ 8,552,878	
Contingency @ 20%					\$ 1,710,576	
OPINION OF PROBABLE TRACK REPAIR COST:					\$ 10,300,000	(rounded to nearest \$100,000)

RECOMMENDED TRACK & BRIDGE IMPROVEMENTS						
Item #	Description	Unit	Unit Price	Quantity	Amount	Comments
1	Track Construction (Siding for Project Awesome)	TF	\$ 225	3,200	\$ 720,000	Assume 1 additional siding will be required to accommodate railroad operations and service to industry - New track construction includes 1' fill, Subballast, 115# New Jt. Rail, Wood Ties, Ballast, & OTM. Track @ \$175/TF, Fill & Subballast @ \$50/TF.
2	Turnouts (for Project Awesome Siding)				\$ 150,000	
3	Crossings (Upgrade Warning Devices)				\$ 2,400,000	
Track Repair Subtotal:					\$ 3,270,000	
Contingency @ 20%					\$ 654,000	
OPINION OF PROBABLE TRACK IMPROVEMENT COST:					\$ 3,900,000	(rounded to nearest \$100,000)

Survey form, Page I

1. Date of Interview: _____
2. Name: _____
3. Title, Affiliation: _____, _____

Description of Project Scenarios (investments described below are not funded or planned)

- a. **Freight Rail Transport.** The movement of bulk or containerized cargo long distances, connecting with regional markets through existing rail corridors. Service is irregular, dependent on shipping needs with stops at distribution centers, warehousing, and / or manufacturing locations. Potential for occasional tourism service, but isn't a priority in this scenario. Improvements to tunnel and bridge structures are necessary, as is reliable external rail service to adjacent railroads (GSMR & NS).
- b. **Tourism Rail.** "Railroad as destination" with an emphasis on passenger amenities, sight-seeing, special events, and stops at casinos, rafting centers, downtowns, and other tourism destinations. Average service 1-2 times daily with seasonal highs and lows.
- c. **Passenger Rail Service.** Emphasis on service that connects with parking facilities and major employment, schools, recreation or business centers (town centers, airport). Rail service 2-4 times daily.

For both (b) and (c) options, investments in station areas, platforms, and parking areas as well as coordination of transportation services to local destinations (e.g., casinos) are considered parts of these scenarios.

For each scenario described above, answer the next five questions:

4. For each of the three areas shown (A, B, and C), which areas have developments coming in the next five years without the A2M Project? (1 to 5 rating, with "5" being certain to develop)
5. Assuming that the A2M Project was in place today, which tracts are likely to develop or redevelop in the next five years? (1 to 5 rating, with "5" being certain to develop)
6. Looking at pictures of various development types on the next two pages, for each tract with a number greater than "1" from the previous question, identify the type(s) of development that potentially could result if the A2M Project were constructed.
7. Based on what you have heard about the A2M Project, how far away would the influence extend for the A2M Project? (check all that apply)
 - Inside Cherokee County
 - From adjacent counties
 - Inside the State
 - Outside the State
8. Which already-developed or developing properties are likely to realize increases in revenues or the number of employees as a result of the Project? (name and identify on map)
 - A. Freight Rail Transport: _____
 - B. Tourism Rail: _____
 - C. Passenger Rail: _____

9. Anything else you would like to add that we have not covered already?

10. Thank you - are there other people that we should speak to with respect to the potential impacts of the A2M Project?



Survey form, Page 2



1. AUTOMOTIVE



2. RESIDENTIAL



3. TOURISM LODGING



Survey form, Page 3



4.



4. EMPLOYMENT

5. NOT SHOWN:

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____



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Survey responses

Date	Name	Title	Affiliation	4A	4B	4C	5A	5B	5C	6A	6B	6C	7F
31-Mar-14	Erik Brinke	Director of Economic Development	Blue Ridge Mountain EMC	5	3	3	5	4	4	1A, 1B, 1C, 2A, 2B, 3A, 3B	1A, 1B, 1C, 2A, 1	1A, 1B, 1C, 2A, 1	Outside State
31-Mar-14	Bill Hughes	Mayor	Town of Murphy Government Official	5	5	5	5	5	5	3B, 4C, 4F	3B, 4E, 5A (restaurants), 4G	4E, 4G	Outside State
31-Mar-14	Phylis Blackmon	Executive Director	Cherokee County Chamber of Commerce	4	2	1	5	5	5	5A (restaurants), 4F, 3B, 4B	4I	4I, 5A	Outside State
31-Mar-14	Nancy Curtis	Mayor	Town of Andrews Government Official	5	3	1	5	4	5	3A, 3B, 3C, 2A	4I, 4H (organic farms)	2A, 3A, 3B, 3C, 4B	
31-Mar-14	Tara Noland	Owner	Cabin Rentals Real Estate	3	4	2	5	5	4	1A, 2A, 2B, 2C, 3A, 3B, 3C, 4B, 4D, 4E, 4F, 4G, 5A, 5B	1A, 2A, 2B, 3A, 3B, 4C, 4D, 4E, 4F, 5A	1A, 1B, 2A, 2C, 3A, 3B, 3C, 4B, 4C, 4D, 4E, 4F	
31-Mar-14	Sherry Bell Dukes	Principal	Highlander Gallery & Emporium/Blue Ridge Highlander Travel and Tourism Magazine	3	5	1	5	5	4	1A, 2A, 2B, 3A, 3B, 3E, 3F, 3G, 5A (restaurants), 5B (Recreation)	1A, 2A, 2B, 2G, 3A, 3B, 4E, 4G	1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, 4E	
31-Mar-14	Andrew DeLuna	ADD	Andrews Police Department	5			5			4B	3B, 1C	4B, 4F, 4A	Outside State
31-Mar-14	Mike Catuto	Transit Director	Cherokee County Transit	3	2	3	4	4	4	3B, 4B	2C, 3C	4B, 4F, 2C, 3B	Outside State
31-Mar-14	Margaret DeLuna	President	Andrews Chamber of Commerce	5	2	2	5	5	5	4B	1C, 2B, 3B	4A, 4B, 4F	Outside State
31-Mar-14	Philip Moore	Senior Planner	Southwestern Commission/Southwestern RPO	5	1	3	5	2	4	1C, 3B, 3C, 4B, 4E	4H, 4I	1A, 1B, 2B, 2C, 3B, 3C, 4A, 4B, 4E, 4F, 4I	Inside State
01-Apr-14	Bill Forsyth	Boardmember	Cherokee County EDC	4	3	2	5	4	3	1A, 1C, 2B, 2C, 3A, 3B, 3C, 4A, 4B, 4C, 4D, 4E, 4F, 4H, 4I	1A, 1C, 2A, 2B, 3A, 3C, 4A, 4B, 4E, 4H, 4I	1A, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 4A, 4B, 4C, 4D, 4F, 4G, 4H, 4I	Outside State
01-Apr-14	Paul Worley	Director	Economic Development Tri-County Community College	4	4	3	5	5	4	2C, 3B, 4A, 4B, 4D, 4E, 4F, 4G, 4I	1A, 2B, 3B, 4E, 4F, 4G, 4I	1A, 2B, 3C, 4A, 4B, 4D, 4E, 4F, 4G, 4I	Outside State

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7T	7P	8F	8T	8P	Comments
Outside State	Blank	Coats American, Baker Furniture	Murphy Depot, Andrews Depot, Chamber	Blank	
Inside State	Inside County	Team Industry, Snap-On Tools			
Outside State		Coats American, Baker Furniture	Downtown Commercial		
Outside State		Baker Furniture, Perker-Reichman, Team Industry	Rafting/Tubing, Hiking, Riding Train	To Murphy from Outlying Areas	
Outside State			Lodging, Shopping, Restaurants, Recreation		
			Lodging, Shopping, Restaurants, Recreation		
Outside State	Inside County	Wood Chips, Other Commodities			
Outside State	Inside County	Farmers	Casino, Restaurants, Downtown	Casino, Downtown	
Outside State	Inside County	Wood Chips, Reichman-Parker, Farmers	Downtown	Transport from within the County and adjoining counties to casino and large plants (workers)	
Inside State	Inside State	Valwood Corporation, Wood Farm	Murphy Depot, Wal-Mart, Casino	Casino, Snap-On Tools, Team Industries, (job access/commutes) possibly	<i>There is some interest in the County with Andrews being the residential area ofr casino employees, and there is general interest in providing more affordable and flexible public transportation services for Stanly Furnitureemployees and casino employees</i>
Outside State		Industry, pulp wood, chip mills, agriculture	Downtown Murphy & Andrews		
Outside State	Adjacent Counties	Coats American, Baker Furniture, ValWood	Downtown Murphy & Andrews, Casino	Casino maybe	All this is dependent on outside connections to rail

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Survey responses, continued

Date	Name	Title	Affiliation	4A	4B	4C	5A	5B	5C	6A	6B	6C	7F
01-Apr-14	Josh Carpenter	Director of Economic Development	Cherokee County Economic Development	3	2	1	5	5	5	4H, 4I	2C, 4E, 4H	4F, 4I	Outside State
01-Apr-14	Chris Logan	President	ValWood Corporation	4	4	4	5	5	5	3A, 4E	4E, 4I	4E	Outside State
15-Apr-14	Andrew Reichman	President	Parker & Reichman, Inc.	4	3	4	4	3	4				
15-Apr-14 and 21-Apr-14		Executive Director	Andrews Valley Initiative	2	1	3	4	3	5	5A (restaurants), 4E	2B, 5B (RV Park)	5A (restaurants), 5C (youth hostel), 4E	
17-Apr-14	Charles West, Sr.	Owner	Wells and West, Inc.	3	5	5	4	5	5	3A, 3B, 3C, 4A, 4F			Outside State
08-Apr-14	Kristy Carter	Regional Planner	Appalachian Regional Commission/NC Dept of Commerce	4	3	2	4	3	4			1C, 2B, 2C, 3A, 4B, 4C, 4D, 4F	Outside State
14-Apr-14	Stephanie Watkins	Program Coordinator	Southeast Industrial Development Assoc. (SEIDA)	4	3	3	5	4	4	5A (restaurants), 4I, 2A	4D, 4F, 4I	1C, 2C, 4B	Adjacent Counties
21-Apr-14	Tom Johnson	Executive Vice-President	AdvantageWest	4	4	4	4	5	4		5A (plastics), 5B (distribution)		Outside State

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7T	7P	8F	8T	8P	Comments
Outside State	Adjacent Counties	Coats American, Baker Furniture, Emerson Building	Murphy Depot, Andrews Depot		Look at re-opening line to north Georgia
Inside State		Parker-Reichman	From Bryson City		
Outside State		Some closed factories may reopen; not sure	Tourism Rail would benefit from synergy of casino development, outdoor center, etc.		Chicks are bought at one day old and raised to 18 weeks, then start laying to produce eggs. Parker & Reichman was the last entity to receive freight rail transport, but they were also receiving truck transported feed even at that time. There was a \$300 surcharge on each carload to NS; getting feed from Cincinnati was about \$3,500/carload which equates to about four truckloads. In the best year P&R ordered 250 cars. There is also more corn being grown in the South which may also make the feasibility of P&R using rail transport for feed. The low speeds make even excursion rail less feasible for passenger rail in both directions, although the scenery is beautiful. Potentially some benefits depending on what kind of business you are in.
Outside State		Not much to enhance	NOC-style development		Many; see original document
		Coats American, Baker Furniture, land between Andrews and Murphy is plentiful and supplied with water			The switch is present to the Coates Building, sold to a company that is interested in rail service. Tax incentives have been put into place.
Outside State		Snap-On may benefit slightly; potential for major manufacturers	Casino, downtowns (if service is structured correctly)	Employers but may be solving a problem that they don't believe they have now	This project needs to benefit the towns, not just the casinos. This benefit may be hard to quantify and make tangible.
Outside State	Adjacent Counties	Warehousing/Distribution industries potentially	Downtown Murphy & Andrews	Depends on stop locations, but likely in-town	As far as the industrial side of business, we have seen more requests for businesses needing freight rail service, perhaps 1 out of 4 or 5 are asking for rail. SEIDA does keep a database and records of which companies do request what kind of services.
		Metal works now but not a great possibility; chip mills could save money by using rail			If rail isn't available then you don't see those projects and they are never factored into the development potential. With rail they can respond to project requests more robustly even for companies that do not require, but prefer, to have rail service. Rail would be a real asset to Cherokee County.

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