Southern Environmental Law Center

29 N. Market St., Suite 604
Asheville, NC 28801
Ph: (828) 258-2023
Fax: (828) 258-2024
djgerken@selcnc.org

September 2, 2009

Mr. David K. Baker
U.S. Army Corps of Engineers
Asheville Regulatory Field Office
151 Patton Avenue Room 208
Asheville, NC 28801-5006

Re: U.S. 74 Relocation – Corps Action ID#: SAW-2009-1346

Dear Mr. Baker:

Please accept these comments on behalf of the North Carolina Wildlife Federation, the Cherokee Group of the Sierra Club, the Southern Appalachian Forest Coalition, WaysSouth, the Western North Carolina Alliance, and the Southern Environmental Law Center.

The North Carolina Wildlife Federation is the leading advocate for all North Carolina wildlife and its habitat and works to create consensus by engaging government, industry and the public in efforts to protect North Carolina's wildlife resources. The Sierra Club is America's oldest and largest grassroots environmental organization. working to protect our communities and the planet. The Southern Appalachian Forest Coalition (SAFC) is a regional non-profit organization whose mission is to protect and restore the wildlands, waters, native forests and ecosystems of the Southern Appalachian landscape. WaysSouth is a nonprofit organization working to promote responsible transportation practices that preserve the unique heritage and environment of Southern Appalachia. The Western North Carolina Alliance is a non-profit organization with the primary goals of protecting and preserving the natural environment and mountain streams of Western North Carolina. The Southern Environmental Law Center is a regional nonprofit providing legal counsel and litigating on behalf of partner organizations across the southeast.

The members of the undersigned organizations are very familiar with the project area for the U.S. 74 relocation. Each of the undersigned organizations include members who reside in the project area and many more who recreate in these areas and appreciate them for their scenic beauty, hiking, wildlife viewing, spiritual renewal, and other recreational and educational activities.

We urge the Army Corps to acknowledge that it cannot, consistent with the mandate of the Section 404(b)(1) guidelines, issue a Department of the Army permit for any of the alternatives currently proposed by the N.C. Department of Transportation for the Route

74 Relocation. Because it is unreasonably committed to a four-lane, interstate standard roadway, NCDOT has refused to consider a practicable alternative, targeted improvements to a two-lane footprint for US 129 and NC143 combined with the economic development strategies, which would achieve NCDOT's overall project objectives with far less environmental damage. Furthermore, the alternatives proposed by NCDOT would cause substantial degradation of aquatic ecosystems, would fail to minimize harm, cannot be fully assessed due to the lack of sufficient information to determine the extent of their water quality impacts, and cannot survive public interest review.

Section 404(b)(1) Guidelines

In deciding whether to issue a Section 404 permit, the Corps must apply the EPA Section 404(b)(1) Guidelines. As required by the Clean Water Act (CWA), the Guidelines specify where and under what conditions dredged or fill material can be discharged lawfully. The Corps cannot issue a permit if any of the following are true: (i) there is a less harmful "practicable alternative" to the project, (ii) the project would cause a "significant degradation of the aquatic ecosystem," (iii) the applicant has not taken appropriate steps to "minimize potential harm to the aquatic ecosystem," or (iv) the Corps does not have "sufficient information" to make a reasonable permit decision. 40 C.F.R. § 230.12(a)(3). The alternatives currently proposed by NCDOT for the U.S. 74 Relocation project fail each of these tests.

The Corps cannot issue a permit for any of the proposed alternatives because there exists a less damaging practical alternative.

The first criterion in the Guidelines provides that the Corps cannot issue a permit if "[t]here is a practicable alternative to the proposed discharge that would have less adverse effect on the aquatic ecosystem, so long as such alternative does not have other significant adverse environmental consequences . . . ." 40 CFR 230.10(a). Under this prohibition, "practical alternatives" are those that are "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." 40 C.F.R. § 230.10(a)(2)(2006) (emphasis added). The Guidelines establish rebuttable presumptions that (i) alternatives for non-water dependent activities that do not involve special aquatic sites exist; and (ii) alternatives that do not involve special aquatic sites have less adverse impact on the aquatic environment. 40 C.F.R. § 230.10(a)(3). Because Corridor K will impact special aquatic sites, including wetlands and riffle/pool complexes, and because a roadway is not a water-dependent activity, no permit may be issued unless NCOT clearly demonstrates that there is no practicable alternative. See 40 CFR 230.10(a)(3).

Even if NCODT fails to study a practicable alternative with lesser environmental impacts, the Amy Corps is required to evaluate independently the availability of less environmentally damaging practical alternatives in light of the legitimate objectives of the project. Friends of the Earth v. Hintz, 800 F.2d 822, 833-34 (9th Cir. 1986) (Corps is required "to ensure that the applicant's stated purpose is legitimate"); Alameda Water & Sanitation Dist. v. Reilly, 930 F. Supp. 486, 492 (D.Colo. 1996) (the Corps "required

independently to review and define the project's overall purpose"); Sierra Club v. United States Army Corps of Eng'rs, 2005 U.S. Dist. LEXIS 36385, *26 (D.N.J. 2005) ("The Army Corps is not restricted to the definition of project purpose contained in a permit application.").

As identified by the Army Corp's request for comments, NCDOT has provided several statements of purpose and need for this project falling into four broad categories. First, NCDOT proposes to "Improve system linkage" by (1) providing a four lane highway connecting Graham County to the Interstate system, (2) completing a missing link of Corridor K, and (3) improving access to the Cherohala Skyway, a tourist attraction. NCDOT's second category of objectives related to the need to "Improve economic and social development" by (1) providing better access to jobs and medical facilities and (2) providing better transportation to and from manufacturers in Graham County, NC. NCDOT suggests the project is needed to improve "highway capacity" by providing Graham with a four-lane connection to the east. Finally, NCDOT argues that action is needed to improve safety by reducing traffic on existing roads and providing a four lane road with modern design standards.

NCDOT has failed to study a practicable alternative that would meet these overall project purpose with far less environmental damage than the alternatives currently under consideration. In particular, NCDOT has refused to consider relocating US 74 to an improved-two lane facility with periodic passing lanes and turn lanes. To the contrary, NCDOT has announced that "Each build alternative is proposed as a four-lane divided highway with partial control of access." (DSEIS at 2-11, emphasis added.)

Upgrades and improvements to the existing two-lane US 129 and NC 143, especially if these highway improvements were combined with other measures directly targeted to economic development in Graham County, such as improvements in communications and education, would meet each of NCDOT's stated purposes for the project. Not only would such an alternative meet all of the project's purposes and needs (economic development, reduce county isolation, improve transportation network and safety) at far less monetary and environmental cost, it would potentially be far more effective in improving the lives of Graham County residents.

The data presented in the Draft Supplemental EIS show that there is no real transportation need requiring this project to be designed as a massive four-lane divided highway as proposed. Table 2.8.1 on page 2-40 of NCDOT's DSEIS shows that, even if no improvements are made to the existing roads, in 2030 these roads still will provide Levels of Service (LOS) of C, D, and A respectively. These Levels of Service are well within the acceptable range for rural highways. Moreover, the DOT's analysis understated the actual Level of Service these existing roads will provide by unjustifiably applying high traffic numbers from one section and by other questionable analyses. Comments of Walter Kulash, P.E., attached. However, to the extent improvement is desired, particularly in safety and in the NC 143 segment, better safety and better LOS easily could be achieved through targeted upgrades to the existing highways, such as passing lanes where warranted, additional lanes and other measures at intersections, better engineering of curves, and better shoulders. Id.

We do not know what these improvements might cost, because the DOT has not considered them, but we can be sure that they would cost far less than the minimum $400 million price tag of the preferred alternative. Id. We can be equally sure that they would require far less excavation and carry much reduced impacts to water quality, habitat fragmentation, and other environmental resources, and would be far more compatible with the County's stated desire to promote ecotourism for economic development. DSEIS at 3-18.

Nor can the DOT's refusal to consider an improved two-lane corridor be justified by stated purpose of encouraging economic development. NCDOT has refused to consider any alternative to encourage economic development in the affected area aside from construction of a four-lane highway. Furthermore, NCDOT has provided no data to support its assertion that construction of a four-lane highway will encourage desirable economic development in Graham County. NCDOT has no expertise in economic and social development, yet the agency has committed itself to those goals by hinging its "need" for this project on the inhibited economic development of Graham County and by making economic and social development a primary purpose of this project. (DSEIS at 1-9, 1-10.) Accordingly, it is incumbent upon NCDOT to consult with true experts in development and to consider alternative approaches to fostering improved economic and social conditions in Graham County. Such alternatives could be combined with targeted upgrades to the existing highways that would resolve any concerns about safety or capacity at far less cost and environmental damage. Thus, an alternative consisting of targeted improvements to a two-lane footprint for US 129 and NC143, when combined with the economic development strategies developed by economic development experts rather than road engineers, would fulfill NCDOT's project purpose with less environmental damage.

The practicability of an alternative based on improving the existing highways is further illustrated by the fact that the 1984 EIS that this Draft is intended to supplement considered such an alternative and eventually rejected it for reasons that no longer hold true. For example, the 1984 EIS asserted that a four-lane highway was needed to provide adequate capacity and level of service. 1984 EIS at 127. As highlighted above, the data in this Draft Supplement contradict that assertion. Further, the 1984 EIS asserted that a four-lane highway was needed to divert traffic from US 19 through the Nantahala Gorge. Id. As with the other analyses and conclusions of the 1984 EIS, at a minimum, NEPA requires a reexamination of this assertion under the present conditions and circumstances, and a reevaluation of the benefits and costs of an "improvements" alternative versus the four-lane alternatives. Lastly, the purpose and need of this particular project is distinct from the purpose and need of the 1984 EIS, and, as demonstrated above, an "improvements" alternative easily can meet the current purpose and need. For all of these reasons, this Draft Supplement should have reanalyzed and reexamined the highway improvements alternative that was included in the 1984 EIS.

Finally, NCDOT cannot justify its devotion to a four-lane design for the proposed project segment based on its stated objective of completing Corridor K. The Appalachian Regional Commission has not required that Corridor K be a four-lane highway. More importantly, NCDOT cannot rely on completion of Corridor K as a purpose for this

project without considering, disclosing and seeking Army Corps review of the impacts of the full project. Because NCDOT has chosen to divide Corridor K into segments for purposes of environmental review and permitting, each segment must be evaluated on its own merits and viable alternatives cannot be rejected based on unanalyzed objectives for the Corridor K route as a whole.

Because a program of improvements to the existing two-lane US 129 and NC 143, when coupled with economic development strategies developed by real economic development experts, would meet all of the NCDOT's objectives for this project, it is a practicable alternative. As is detailed below, this practicable alternative would have far less environmental impact than the four-lane construction alternatives currently considered by NCDOT. As a result, the Army Corps cannot issue a permit for any of the alternatives currently proposed by NCDOT.

The Army Corps cannot issue a permit for any of the proposed alternatives because they will cause significant degradation of the aquatic ecosystem.

The second criterion in the Guidelines provides the Corps cannot issue a permit if "[t]he proposed discharge will result in **significant degradation of the aquatic ecosystem** under §230.10(b) or (c)." (40 C.F.R. § 230.12(a)(3)(emphasis added).) Section 230.10(b) prohibits discharges of pollutants that will jeopardize threatened species or result in a violation of water quality standards or toxic effluent standards. Section 230.10(c) prohibits discharges that will cause or contribute to significant degradation of the waters of the United States. The four-lane alternatives currently proposed by NCDOT will cause substantial degradation of the aquatic ecosystem and substantially more degradation than would the unconsidered alternative of improvements to the existing two-lane US 129 and NC 143 coupled with economic development strategies.

The threat of substantial degradation is especially significant in these high quality waters. As conceded by NCDOT, recent data indicate that Stecoah Creek and its tributaries are High Quality Waters. DSEIS at 3-69. NCDOT failed to recognize or disclose, however, that most of the affected streams in the project area are of very high or pristine water quality that could suffer greatly from this project. The Clean Water Act requires the Corps to prevent degradation of both existing and potential uses of these high quality waters.

The four-lane proposals currently considered by NCDOT will cause substantial degradation of these high quality waters by destabilizing the already unstable geology in the area, causing sedimentation and channelization from temporary construction activities, disturbing long-term hydrology in the area and, in all probability, exposing acid-producing rocks.

The alternatives currently considered by NCDOT are at significantly risk of exposing acid-producing rock with the potential significantly to degrade water quality in and

around the project corridor. NCDOT's Draft Supplemental EIS totally failed to consider the very significant issues of exposure of acidic rock and the resulting acidic drainage and other pollution. Comments of Melanie Mayes, Ph.D. (attached); Comments of Steven Yurkovich, Ph.D. (attached). As Drs. Mayes and Yurkovich discuss in some detail, the geologic formations that the highway likely will cut through contain significant potential for acid-bearing rock, and the impacts from exposure of this rock can be exceedingly damaging.

Acid drainage threatens the entire lifecycle of a mountain stream. When such rocks are exposed during construction, the resulting runoff can reduce productivity of aquatic fungi in streams,[1] reduce density and diversity of aquatic macroinvertebrate communities for a decade or more,[2] completely extirpate aquatic salamander species for decades,[3] and devastate fish species, especially native southern-strain brook trout.[4]

Acid-producing rock formations, when present, can be highly reactive. Even when undisturbed, acid-producing rock formations can increase the acidity of waters and introduce heavy metal contaminants into those waters. The geology of bedrock formations has a significant effect on the chemical composition of surface water and on the sensitivity of aquatic ecosystems to acid drainage.[5] Studies have confirmed that acid drainage from naturally occurring outcroppings of acid-producing rock can degrade benthic communities by reducing community density and diversity and creating a community dominated by tolerant organisms.[6] The tendency of acid-producing rocks in the region to affect water quality even when undisturbed suggests that degradation of water quality and aquatic habitat almost inevitably would result from excavating large quantities of those rocks in the steep and unstable terrain found in the project area.

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[1] See D.A. Geverd, Effect of Anakeesta Leachate on the Decomposition of Allochthonous Leaf litter by Aquatic Hymphomycetes, Masters Thesis, Western Carolina University, 2002.

[2] Man-Induced Acid Drainage Impact on Benthic Macroinvertebrate Communities in the Great Smoky Mountains National Park, W.F. Trumpf, E.L. Morgan, and R. Herrman. A follow up study, which included surveys at Walker Camp, a stream affected by naturally occurring acid-drainage, found the same result and concluded that "[o]nce thought temporary, this study found that biological stress related to acid leachate can last for greater than 10 years for the man-caused event without apparent diminished effect." Aluminum Precipitation, Beech Flats and Walker's Prong Creeks, Great Smoky Mountains National Park, W.F. Trumpf, E.L. Morgan, and R. Herrman.

[3] See Anakeesta Stream Acidification and Metal Contamination: Effects on a Salamander Community, D.J. Kucken, J.S. Davis, J.W. Patrenka, and C.K. Smith, 23 Journal of Environmental Quality 1311-1317 (1994) (Attachment 12). See also Huckabee, J.H., C.P. Goodyear, and R.D. Jones. 1975. See also Acid rock in the Great Smokies: Unanticipated impact on aquatic biota of road construction in regions of sulfide mineralization. Transactions of the American Fisheries Society 104(4):677–684 (Attachment 13); R.C. Matthews and E.L. Morgan, Toxicity of Anakeesta Formation Leachates to Shovel-Nosed Salamander, Great Smoky Mountains National Park, 11 Journal of Environmental Quality 102-106 (1982) (Attachment 14); See also Gore, J. A. 1983. The distribution of desmognathine larvae (Amphibia: Plethodontidae) in coal surface impacted streams of the Cumberland Plateau, USA. Journal of Freshwater Ecology 2:13-23.

[4] See Anakeesta Leachate Studies and Native Brook Trout Investigations, E.L. Morgan, M.H. Hoff and W.F. Trumpf

[5] See also Little Tennessee Basinwide Management Plan May 1997 at 4-19 (hereinafter BNPS MP 1997).

[6] Aquatic Ecological response to Acid-Toxic Metal Leachate Mitigation in Southern Appalachian Mountains: Highway Drainage Control, Part II – Citico River, 1 July 1987 – 30 June 1980, at 5 (hereinafter Tellico Study 1980)

Other well-known examples of road construction in this region having exceedingly detrimental effects on streams and water quality include construction of US 441 near Clingman's Dome (exposure of acid-producing rock caused low pH and metals contamination leaving streams devoid of life for as long as 10 years after construction), and construction of the Tellico-Robbinsville Road near the western boundary of the National Park (acid drainage from acid-producing rock used as roadfill increased acidity and metal concentrations creating conditions that caused 100% fish mortality even after 10 years of remediation efforts). None of these examples are mentioned or addressed in the Draft Supplemental EIS, nor is the experience of constructing section D of this very project discussed at all. These projects demonstrate the extent of the permanent devastation that could be caused by excavation of acid-producing rocks in the study area. This history makes clear that the excavation of acid-producing rock can lower pH and introduce heavy metal contaminants that devastate water quality and scour streams of all life and that remediation of contamination from acid-producing rock is exceedingly difficult.

Despite the high risk of acid-producing rock in the area and the substantial degradation it can cause to aquatic ecosystems, NCDOT's DSEIS for the project is entirely silent. Page 4-29 of the DSEIS is the only place where the potential for acid drainage is even discussed, stating that "acidic inputs are substantial concerns in all of the watersheds crossed." But no strategies are discussed to mediate acid drainage and the potential for the geology to generate acidity is also not discussed.

The significance and depth of NCDOT's failure to consider the risk of acid producing rock in the area is illustrated by comparison to other recent EISs for road projects in this region. For example, the EIS for the proposed North Shore Road addressed the potential for exposure of acidic rock in great detail and provided an extensive mitigation strategy. As Dr. Mayes noted, "[t]he area in question here is just as sensitive as that of the North Shore Road in terms of its geology and environment." Comments of Melanie Mayes, Ph.D., at 5. Similarly, the Draft EIS for another section of Corridor K (Route 64 in Tennessee) included a lengthy analysis of the impacts of exposure of acidic-producing materials and an extensive plan for handling acid-producing rock (Appendix B). Further, the FHWA's own "Guidelines for Handling Excavated Acid-Producing Materials" sets forth extensive procedures for the pre-design phase of a project for assessing the risks of excavating acid-producing materials and for developing plans should these materials be encountered. NCDOT's Draft SEIS fell far short of these standards and utterly failed to provide the information needed to assess these very significant risks or for outside experts, such as Drs. Mayes and Yurkovich, to review the agency's analysis.

The threat posed by the presence of acid-producing rock in the project area would be significantly diminished under the practicable alternative of improvements to the existing two-lane US 129 and NC 143 coupled with economic development strategies. NCDOT's records clearly acknowledge that a two-lane footprint would drastically reduce the need for excavation and grading for the project. Because of its reduced footprint, a two-lane configuration has available to it entirely different routing options that more closely follow the contour of the landscape, minimizing grading. In particular, a two-lane configuration could avoid the need for a tunnel (or, as has been proposed, a massive cut) through the

Snowbird Mountains eliminating half the project cost and the majority of the excavation required. Reduced excavation and grading means reduced exposure of potentially acid-producing rocks and less degradation of aquatic ecosystems.

Road construction in the unstable geology and rugged terrain of the project area increases the risk of landslides and slope failures that can substantially degrade aquatic habitat for decades to come. Dr. Mayes' comments outlined multiple considerations regarding geologic stability ignored by NCDOT's DSEIS. Comments of Melanie Mayes, Ph.D., at 1-3. In sum, "[b]ecause of the lack of relevant geologic information in the DSEIS, it is impossible to judge the short- or long-term geotechnical stability of the proposed road and tunnel." Id. at 2. The highly unstable geology in the area means that even if acid-producing rocks are properly avoided or remediated, they remain a substantial threat to the aquatic ecosystem in the long run because future slides or slope failures could expose them. In addition, sedimentation and other impacts from slope failures along the massive road cuts and fills required to construct a four-lane divided highway in this rugged terrain present a long-term threat to the health of aquatic ecosystems.

Such slope failures are not hypothetical, as they are a regular occurrence along the Blue Ridge Parkway, I40 and the roadways of the Great Smoky Mountains National Park. On March 2, 2006, for example, Park officials closed the Foothills Parkway in Blount County because of fallen debris from a landslide.[7] In May 2003, another slide on the Foothills Parkway in Blount County left a vertical drop 200 feet down and almost 140 feet across the face of the road.[8] Also in May, 2003, a landslide 30 feet wide and 3 feet deep caused the closure of the Gatlinburg Bypass.[9] Similarly, the North Carolina Geological Survey has documented a series of slides along Interstate 40 in similar geological conditions. According to that report, "[r]ock fall, rock slides and debris flows require nearly continual maintenance to keep the road clear – especially during heavy rainfall."[10] On July 1, 1998, a major rock slide less than a mile from the North Carolina line closed both lanes for over two months. Previously, a major rock fall closed the eastern tunnel portals in 1985 and a slide blocked eastbound lanes in May 1978. Id. Thus, rock slides and falls continue on I40 nearly 30 years after the completion of that road. Because the project corridor contains similar rocks with similar structural orientation, road construction could produce similar results.

Again, the practicable alternative of improvements to the existing two-lane US 129 and NC 143 coupled with economic development strategies would minimize cuts, fills and excavation and drastically reduce the degradation of aquatic ecosystems attributable to unstable slopes in the rugged terrain of the project area.

Road construction will cause substantial degradation in the form of channelization, sedimentation and permanent alterations to the natural hydrology of affected streams and

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[7] See Great Smoky Mountains National Park News Release, March 3, 2005.
[8] Great Smoky Mountains Press Release, July 20, 2004.
[9] Great Smoky Mountains National Park Storm Damage Report, May 6, 2003.
[10] See Interstate Roadside Geology Of North Carolina, http://gis.enr.state.nc.us/sid/zGeologic_maps/Geology_frame.htm.

groundwater. The Aquatic Resources Analysis ("AQUA") prepared by the U.S. Forest Service for the project found that "substantial impacts will occur to project area waters, particularly through water quality and hydrological factors and channelization." AQUA at 7. The AQUA also noted that past road construction has "degraded and eliminated habitat through sedimentation input, channelization, riparian destruction, and possible acid bearing rock exposure," and that a very recent example of this degradation was the construction of section D of this project which impacted waters within the Fontana Lake watershed and Fontana Lake itself. Id. NCDOT failed to acknowledge these impacts in its DSEIS for the project. Each of these impacts would be reduced by an alternative of improvements to the existing two-lane US 129 and NC 143 coupled with economic development strategies.

Because construction of this project will cause substantial degradation of the aquatic ecosystem which could be avoided or greatly reduced by the currently unconsidered alternative of improvements to the existing two-lane US 129 and NC 143 coupled with economic development strategies, the Corps cannot issue a DA permit for any of the alternatives currently proposed by NCDOT.

The Corps cannot issue a permit for any of the proposed alternatives because they fail to minimize potential harm to aquatic ecosystems.

The Guidelines also prohibit issuance of a permit where: "The proposed discharge does not include all appropriate and practicable measures to ***minimize potential harm*** to the aquatic ecosystem . . . ."[11] At this point, because NCDOT has far to go in the way of minimization, any discussion of its mitigation plan is premature. Nonetheless, there are some aspects of NCDOT's obligation to minimize impacts that bear mentioning now. In particular, strategies to mitigate the acid-producing potential of acid-producing rock are likely to fail.

It is clear from the FHWA guidelines for mitigating acid-producing rock that the prevalent conditions in the project area are the most difficult possible for successful encapsulation of acid-producing rock. The guidelines note that "steep and rugged topography probably presents the worst of the possible situations" because of large cuts, large embankments, and generally inadequate fill material. Guidelines for Handling Excavated Acid-Producing Materials, DOT FHWA-FL-90-007, Don Byerly, 1990 at 3 (Byerly). Regions with heavy precipitation like the project area are prone to "strong chemical weathering" of acid-producing materials as described in the FHWA guidelines. Byerly at p. 4 Figure 1. Furthermore, unstable geology in the project corridor may necessitate extreme slope cuts to minimize the risk of slides, which, in turn, reduces the effectiveness of acid-producing mitigation strategies by increasing acid drainage from rock faces exposed by road cuts.

[11] 40 C.F.R. § 230.12(a)(3)(emphasis added).

In the face of these challenges, NCDOT has offered no explanations for its plans to minimize the threat of acid-producing rock. NCDOT has failed to explain how it will mitigate the risk of acid-producing rock exposed during construction and before it can be encapsulated. NCDOT has failed to consider the environmental impact of hauling potentially acid-producing rock to encapsulation sites. Even after, acid producing rock is encapsulated, the first 5 to 15 years after encapsulation are likely to generate effluent with highly variable water quality that can degrade water quality in receiving streams. Furthermore, mitigation strategies for acid-producing rock have not been in use long enough to provide solid data about their efficacy in the long term. Nor has NCDOT considered the risk that *thiobacillus ferrooxidans*, an iron bacteria common in environments rich in sulfidic rock, will develop in encapsulated fills as effectiveness of those fills deplete over time. The bacteria can speed up the rate of pyrite breakdown by a factor of 10^6.[12]

Nor has NCDOT considered the substantial potential of acid-production from rock faces exposed during road construction. When rock faces of acid-producing rock are exposed by roadcuts, however, the impact of water quality can be dramatic. Road cuts made in the Great Smoky Mountains National Park in 1962 continue to generate acid drainage during rain events.[13] More recently, an extensive study of the acid drainage generated at the site of I99 construction in near Skytop, Pennsylvania found that rock faces exposed by excavation of Acid-producing rock created acidic salt blooms that degraded water quality when washed away during rain events.[14] This omission is significant because acid production from exposed road cuts may be significant along the project corridor because the unstable geology and sharp topographical relief in the project area will require massive road cuts and exposed rock faces.

For these reasons, it is unlikely that NCODOT will be able successfully to mitigate the impacts of acid-producing rocks in the project corridor.

The Corps cannot issue a permit for any of the proposed alternatives because it lacks sufficient information to make a reasonable judgment about their impact on water quality.

The fourth criterion under the Guidelines prohibits the Corps from issuing a Section 404 permit if "[t]here does not exist ***sufficient information*** to make a reasonable judgment as to whether the proposed discharge will comply with these Guidelines."[15] As stated above, NCDOT has failed entirely to address the potential for acid-producing rocks

[12] See Tingle, A., 1995, A geochemical assessment of highway construction through sulfide rocks, University of Tennessee, MS Thesis, 205p.
[13] See Hammarstrom et. al., *Weathering of Sulfidic Shale and Copper Mine Waste: Secondary Minerals and Metal Cycling in Great Smoky Mountains National Park, Tennessee and North Carolina, USA*, 45 Environmental Geology 35, at 39 (2003)
[14] Remediation Plan I-99 Construction Sections A12 And C12 Acid Rock Drainage (May 2004) at 38
[15] 40 C.F.R. § 230.12(a)(3)(emphasis added).

in the project corridor and the significance of the unstable geology in the project corridor. Without that information as well as information about mitigation strategies and their efficacy, the Corps lack the factual basis it needs to determine whether the alternatives proposed by NCDOT will cause water quality violations. In addition, NCDOT has provided inadequate information about the economic development potential of the project as compared to other practicable alternatives, such as a two-lane configuration with targeted economic development investments, for NCDOT to conclude that alternatives offered by NCDOT are justified or that they survive public interest review.

Public Interest Review

Public interest review gauges the public and private need of the project. Environmental Law Institute, *The Federal Wetlands Permitting Program: Avoidance and Minimization Requirements* 2 (Mar. 2008); 33 C.F.R. 320.4(a)(1) (describing public interest review and stating that the Corps must deny the permit if the application does not comply with the § 404(b)(1) Guidelines). Public interest review requires the Corps to consider any "probable impact which the proposed activity may have on the public interest." 33 C.F.R. § 320.4(a)(1). Benefits must be balanced against detriments. *Id.*

The stated "needs" for this project (inhibited economic development of Graham County, geographic isolation, and safety) and the project's purposes (improve system linkage, improve economic and social development, improve highway capacity and development) do not support the single-minded focus of NCDOT on building a four-lane highway in Graham County, especially when NCDOT's own data show that there is no genuine transportation need for such a massive highway, the highway will cost approximately $400 million (roughly $47,000 for each of Graham County's approximately 8500 current residents), and the highway will fragment one of North Carolina's most pristine regions, including the Nantahala National Forest. To the contrary, it is apparent that these needs and purposes could be well-served, at far less monetary and environmental cost, by well-designed improvements to the existing roads in Graham County (US 129 and NC 143) combined with other steps targeted to promoting economic development. Graham County and western North Carolina deserve a thoughtful, multifaceted approach to improving transportation and promoting economic growth rather than the blunt instrument of an unnecessary four-lane highway conceived fifty years ago. As a result, the project alternatives as currently proposed by NCDOT cannot survive public interest review.

Conclusion

For the foregoing reasons, the Corps could not grant a DA permit for any of the alternatives proposed by NCDOT as there is a less environmentally damaging practical alternative, improvements to the existing two-lane US 129 and NC 143 coupled with economic development strategies. If the Corps continues to consider the application, a public hearing is necessary to fully ventilate the serious deficiencies in the proposed plan.

Sincerely,

Austin DJ Gerken
Southern Environmental Law Center
29 N. Market St., Suite 604
Asheville, NC 28801
On behalf of:

Julie Mayfield
Executive Director
Western North Carolina Alliance,
29 N. Market St., Suite 610
Asheville, NC 28801
828- 258-8737

Christopher E. North
Conservation Director
North Carolina Wildlife Federation
2155 McClintock Rd.
Charlotte, NC 28205
704-332-5696

Elizabeth Tallman
Chair
Cherokee Group of the Sierra Club
etallmanthebeth@gmail.com

Hugh Irwin
Program Director
Southern Appalachian Forest Coalition
46 Haywood Street, Suite 323
Asheville, NC 28801
(828) 252-9223

Holly Demuth
Executive Director
WaysSouth
29 N. Market St., Suite 604
Asheville, NC 28801
(706) 508-3711

MEMORANDUM

DATE: October 11, 2000

TO: D. J. Gerkin, SELC

Doug Ruley, SELC

FROM: Walter Kulash, P.E., Traffic Engineer

PROJECT: US 74 relocation

RE: DSEIS Review, Traffic Capacity

Introduction

Thank you for inviting my review of *Section 2.8, Traffic Capacity of the Alternatives*, and other related material from the *Draft Supplemental Final Environmental Impact Statement* (hereinafter "DSEIS) for the US 74 relocation from US 129 in Robbinsville to NC 28 in Stecoah in Graham County, NC, State Project Number 8.T930201.

My review is informed by my experience as a licensed Professional Engineer (P.E.) with over 30 years as a consulting transportation engineer. Most of this experience involved projection of traffic volumes, computation of traffic capacity and designing for accommodation of future traffic demands. Since the early 1990's I have focused on establishing a better balance between the narrow goal of accommodating vehicular traffic and a broad range of community and quality-of-life concerns. Clients for this area of my work include state DOTs, local governments, health-related foundations and advocacy groups.

Summary and Conclusions

Based on my review of the DSEIS, I offer the following conclusions:

- The No-Build scenario has ample spare capacity to meet the Year 2030 traffic demand. None of the increment of capacity added by the recommended alternative, a four-lane expressway (the "B&C scenario) is needed for year 2030 demand.

- The No-Build scenario provides a fully acceptable level-of-service (LOS) for the projected year 2030 traffic demand.

- Modest improvements common on two-lane roads in North Carolina would greatly improve the performance of the No-Build scenario

- The lack of analysis of a modestly improved No-Build scenario substantially degrades the quality of the environmental analysis in the DSEIS.

- The increment of traffic growth assumed to be generated by the recommended project (B&C scenario) is not supported and is not analyzed for further impacts

These conclusions are discussed in further detail in the following sections of this memorandum.

Ample Spare Traffic Capacity on No-Build Scenario

Projected year 2030 traffic volumes (rural segments, excluding Robbinsville) for the No-Build scenario (DSEIS Exhibits 2.8.1c through 2.8.1e) range from a low of 4,000 average daily traffic (ADT) just north of the US 74/NC 129 junction to a maximum of 11,600 ADT on a 1500-foot segment of SR 143 just east of the US 129/SR 143 junction in Robbinsville. Averaged over all segments (DSEIS Exhibits 2.8.1c through 2.8.1e) the projected year 2030 daily traffic volume is 5,400 ADT.

The capacity of a typical rural two-lane highway ranges from 15,000 ADT to 18,000 ADT, depending on directional balance of flow, percentage trucks and terrain. Thus, the No-Build scenario, a two-lane rural highway with its projected Year 2030 traffic volume ranging from 4,000 ADT to 11,600 ADT, and with an *average* volume of 5,400 ADT, has ample spare capacity throughout. As a percentage of Year 2030 demand, spare capacity ranges from 40 percent to310 percent. The large margin of spare capacity is further accentuated by the short length (around 0.25 mile, or only two percent of the route) of the maximum-volume segment with its Year 2030 ADT of 11,600.

At signalized intersections, capacity is reached as "saturation flow rate" (i.e., the combined per-lane volume of the four most demanding ("critical") approaches to the intersection) nears 1,700 vehicles hourly. At the three signalized intersections in the No-Build scenario (DSEIS, Table 2.8.2), the saturation flow rate ranges from 490 to 940 vehicles hourly, throughout both the AM .and PM peak hours. Expressed as a percentage of Year 2030 demand, therefore, the spare capacity at the three signalized intersections ranges from 80 percent to 250 percent.

Fully Acceptable Level-of-Service (LOS) in the No-Build Scenario

LOS on Rural Highway Segments -- On two lane rural highways traffic level-of-service (hereinafter "LOS") is correlated to travel speed, which in turn is largely dependent on the percentage of time that a driver is unable to "pass" (overtake) immediately preceding vehicles.

The LOS reported for the No-Build scenario (DSEIS Table 2.8.1) is fully acceptable for the users of that route in the Year 2030. Specifically, the US 129 segment (segment nomenclature from DSEIS Table 2.8.1) will operate at LOS "C"in the peak hour, with reductions of speeds of around 2-3 miles per hour (MPH) from the "free flow" (posted) speed. The NC 28 segment will operate in the peak hour at free-flow speed (i.e., with no reduction in speed). A short piece (most likely around one-quarter mile) of the NC 143 segment will operate in the peak hour at a reduction of speed of 3-4 MPH. At all times other than the two daily peak hours on weekdays, LOS on all segments will operate at or very near LOS "A".

There is no national (Federal Highway Administration, or FHWA) or NCDOT standard for LOS. Rather, both FHWA and NCDOT offer guidelines that call for maximizing the LOS, balancing it against the environmental and financial cost involved in achieving it. Throughout the State and the US, as drivers accept the reality of population growth and more vehicle use, and as the financial and environmental cost of road widening escalates rapidly, the acceptance of LOS "D" and "E" is commonplace. Where quality of life (often associated with neighborhood, "Main Street", historical or scenic value) is important, even LOS "F" is considered fully acceptable.

In computing the LOS for segments of the No-Build scenario, the DSEIS uses "the highest daily traffic volume on each of these sections..." (DSEIS page 2-39). This use of a highest-volume link to characterize an entire segment of road is often a reasonably conservative practice ensuring against overstating LOS. However, in the case of the NC 143 segment (DSEIS Table 2.8.1), with its wide variation in traffic volumes throughout the segment, using the highest-volume link as the basis for LOS analysis distorts and seriously understates the actual LOS for the entire segment. On the NC 143 segment of the No-Build scenario, the highest-volume link, only 0.2 miles in length just to the east of US 129 in Robbinsville, has a volume of 11,600 ADT. The average ADT *on all remaining links* of the NC 143 segment, 8.6 more miles eastward to the NC 143/NC 28 junction, is only 6,600 vehicles daily. Thus, the LOS on the entire 8.8 miles segment is being computed on the basis of an ADT of 11,600 vehicles observed on a single small link, while the ADT on 98 percent of the segment (8.6 miles of 8.8 miles total) averages 6,600 daily vehicles, or only 59 percent of the link volume used in the analysis.

Beyond the issues of using a non-representative link volume for the entire segment analysis, there is a further question of correctness of the LOS computation methodology for the highest-volume link (i.e., the 0.2 mile link on NC 143 just to the east of US 129). The land use and traffic character of this link of NC 143 are not rural, but are, in traffic

planning nomenclature, "urban". "Urban" conditions, as long defined in the "bible" of highway design, *A Policy on Geometric Design of Highways and Streets* (the "AASHTO Green Book") include commercial street frontage, frequent intersecting streets, numerous driveways, posted speeds of 45 MPH or less and a driver preoccupation with access and parking, rather than high-speed long distance travel. Using the "rural two lane highway" methodology for LOS for the highest-volume link appears to be an inappropriate choice of methodology. Either of two other methodological approaches would be far more appropriate for this link: (1) adapt the multi-lane urban methodology given in the *Highway Capacity Manual* for use on a two lane urban section, an approach regularly adopted by public agencies or (2) following procedures used in all urban areas, ignore link volume on urban links and instead establish LOS completely on the basis of signalized intersection LOS, almost always a more conservative (i.e., lower) measure of LOS than link measures.

LOS At Signalized Intersections – At signalized intersections, the level-of-service (LOS) is based on the average delay per vehicle during the daily peak hour of traffic. LOS "C" and LOS "D" are defined as average delays of 25-35 seconds, and 35-55 seconds, respectively. Under both LOS "C" and LOS "D" conditions, and with a typical signal cycle length of 90 – 129 seconds, a significant number of peak hour drivers encounter a green signal upon arrival at the intersection, and therefore experience no delay at all. For those stopped at the red phase of a signal operating at either LOS "C" or LOS "D", there is an overwhelming probability of clearing the signal (i.e., proceeding through the intersection) at the next green indication for that approach.

The Year 2030 signalized intersection LOS for the No-Build scenario (DSEIS Table 2.8.2) are fully acceptable for both daily peak hours, specifically: LOS "C" at the SR 1106/US 129 intersection, LOS "D" at the NC 143/NC 129 intersection, and LOS "C" at the NC 143/SR 1293 intersection..

The low levels of delay (25-55 seconds in the peak hour, above) are seen, by the driving public, as normal smoothly functioning traffic. As is the case with rural LOS (above), there are no national or state standards for signalized intersection LOS. Rather, widely accepted guidelines call for avoiding congestion (appearing at LOS "E" and "F") while respecting constraints of funding and quality-of-life concerns.

LOS at Unsignalized Intersections – Unsignalized intersection LOS is based primarily on the delay experienced by drivers intending to enter the main road from STOP-sign controlled approaches on the minor road.

Of the eight unsignalized intersections analyzed in the No-Build scenario, five have Year 2030 peak hour LOS "B", and three have Year 2030 peak hour LOS "C" (DSEIS Table 2.8.3). Thus, all unsignalized intersections in the No-Build scenario operate with little or no delay to motorists.

By contrast, the "build" ("B&C) scenario has Year 2030 peak hour LOS "F" (unacceptable delay) at two intersections, LOS "E" at two, LOS "D" at one and LOS "C" at six. None of the twelve unsignalized intersection analyzed in the B&C scenario have LOS "A" or "B". The B&C scenario "cures" the problematical unsignalized intersections by converting nine of them to signalized intersections (DSEIS Table 2.8.3, *2030 B&C (with improvements)* column), a cure that is not needed in the No-Build scenario.

Modest Improvements Would Greatly Improve No-Build Scenario

A series of modest improvements, frequently made to two-lane streets and highways in North Carolina and throughout the US, would greatly improve the performance of the No-Build scenario while incurring only a small fraction of the environmental and dollar cost of the B&C scenario. Some of the more common such improvements are:

- for rural two-lane highways: short segments of passing lane, climbing lanes on major upgrades, spot removal of excessive grade and curvature, provision of shoulders, auxiliary left turn lanes at selected locations, right turn deceleration lanes at selected locations, short sections of median at intersection key intersections, intersection lighting at selected locations, short segments of continuous two-way left turn lane in built-up residential areas.

- for in-town two-lane roadways: auxiliary left turn lanes at key intersections, short segments of continuous two-way left turn lane in business areas, curb and gutter cross section, access management at strip commercial sites.

- at signalized intersections: auxiliary left turn lanes, auxiliary right turn lanes, more sophisticated vehicle detection and actuation, auxiliary through lanes at rural intersections, conversion from signalization to roundabout traffic control.

Environmental Analysis Degraded by Lack of Properly Defined No-Build Scenario

The Year 2030 No-Build scenario does not incorporate even the reasonable "housekeeping" improvements (such as auxiliary turn lanes at intersections) that would ordinarily be incorporated on such a highway over a 20 – 25 year span. Consequently, the No-Build scenario is relegated to a "straw alternative", designed to perform badly in the future. That it does not do so (see preceding sections on capacity and LOS) is indicative of the meager need for widening, even by the Year 2030.

Failure to properly equip the No-Build scenario with improvements that could be reasonably and routinely expected seriously degrades the environmental and economic feasibility analysis of all other alternatives considered, including the B&C scenario. The No-Build scenario as currently defined does not represent a proper reference point for gauging the financial and environmental cost of other alternatives. Rather, the currently defined No-Build scenario is artificially constrained to keep exactly its existing

characteristics until 2030, presumably leading it to "fail" and thereby bringing the need for other, major improvements such as widening.

In the existing DSEIS analysis, there is no way to compare a properly equipped No-Build scenario with more sweeping alternatives, such as the B&C scenario. Almost always in considering road improvements, there is a range of alternatives, with at least one of them (usually a well-engineered No-Build of some sort) providing a large fraction of the benefit of the more sweeping alternatives, but at fraction of the environmental and dollar cost. In the existing definition of alternatives in the EIS, however, there is no way to make such an assessment. Large questions of environmental impact and economic feasibility remain unanswered.

Questionable Increment of Traffic Growth Due to Road Widening

In the past, NCDOT has argued strenuously against the notion that new road capacity "induces" more traffic. It is perplexing, therefore, to see claims for a large increment of such induced traffic in the case of the B&C scenario.

The chain of impacts associated with the large increment of traffic growth projected for the B&C scenario is not examined in the DSEIS. Does the growth in traffic represent longer distance commuting and shopping" If so, the additional vehicle miles of travel and the loss in local retail revenue caused by the widening needs to be computed. Does the economic growth associated with the traffic increment come at the expense of a loss in economic activity elsewhere? If so, then this loss needs to be identified.
Or does the new traffic come from entirely new basic activity, such as resource extraction or new capital formation? Hardly likely.

WALTER M. KULASH, P.E.
Traffic Engineer

EDUCATION

Post-Graduate Studies, Civil Engineering (Transportation Planning and Systems Analysis), Northwestern University, Chicago, Illinois

Master of Business Administration, University of North Carolina, Chapel Hill, North Carolina (1965)

Bachelor of Science, Industrial Engineering, North Carolina State University, Raleigh, North Carolina (1964)

EXPERIENCE

Principal, Senior Transportation Planner, Glatting Jackson Kercher Anglin, Inc., Orlando, Florida (1987 to present)

Senior Transportation Planner, Post, Buckley, Schuh & Jernigan, Inc., Orlando, Florida (1984 to 1987)

Senior Associate, Alan Voorhees & Associates, McLean, Virginia (1971 to 1984)

REGISTRATION

Professional Engineer, Florida, #45920

MEMBERSHIPS/ASSOCIATIONS

- Institute of Transportation Engineers
- American Society of Civil Engineers
- Congress for the New Urbanism

MAJOR AREAS OF EXPERTISE

Over 30 years of experience in traffic engineering for new private development and public street systems, and in planning public transit. Walter's focus is on restoring balance to our streets, improving not just their performance for vehicular traffic but also their livability, appeal for non-motorized travel, as good environments for business, and as focal points of civic pride and enthusiasm. This approach, now a part of the "new urbanism" and "context sensitive" road design, has included the design of new communities and, the "retro-fitting" of existing damaged areas, such as strip commercial and early-generation shopping malls, and the addition of "missing" transportation elements, such as Light Rail Transit and self-propelled modes of travel, into existing streets

PROJECT AREAS

- *Designing/Redesigning roads to better fit their context*: conversion of waterfront freeway to boulevard in Chattanooga, rural and town road design on Route 50 in Virginia; boulevard plan for Williamsburg, Virginia, reconfiguration of interchanges in Norfolk, changing freeway plan to parkway on US 202 in Pennsylvania.
- *Repairing and reclaiming battered urban arterials*: reducing lanes on NY5 in Hamburg, New York; forming town centers and park areas on Route 51 in suburban Pittsburgh.
- *Restoring major downtown streets* as important civic areas: Second/Third Streets, forming a major boulevard in downtown Cincinnati; transitioning Route 22 from a strip corridor to a town center corridor in Monroeville, Pennsylvania; converting the road ring around Baltimore's Inner Harbor to a pedestrian and visitor-friendly environment.
- *Interventions in announced road plans*: Route 179 through Red Rocks area in Sedona, Arizona; right-sizing freeway to a parkway through Shelby Park in Memphis; expert testimony for the withdrawal of plans for a surface freeway through South Pasadena, California; critical review and alternative for the Mon-Fayette Expressway in Pittsburgh.
- *Residential street design*: street designs for numerous communities, including Bluffton, South Carolina; Centerville, Ohio; Liberty, California; Suffolk, Virginia.
- *Town Center Streets*: New urbanist street and block layouts in Knoxville, TN, and Winter Park, FL, Williamsburg, VA.
- *Policy Advice on "Smart Growth" traffic planning*: *PennDOT, New Jersey DOT, Delaware Valley RPC:* Guidelines for balancing road capacity improvements against a wide range of community values

PUBLICATIONS

- *Residential Streets*, Third Edition, 2001, Urban Land Institute, (Principal Author).
- *Time Saver Standards for Urban Design*, 2003, McGraw Hill Companies, Traffic Calming, Section 7.2.
- *"Can't Get There from Here – Or Can We?"*, Forum for Applied Research and Public Policy, Summer, 2001.

Dr. Melanie A. Mayes
Knoxville, TN, 37917

8/23/09

Mr. David K. Baker
Army Corp of Engineers
Asheville Regulatory Office
151 Patton Ave. Room 208
Asheville, TN 28801-5006

RE: Corps Action ID No. SAW-2009-1346, TIP Project No. A-9 B&C

Dear Mr. Baker:

Enclosed please find my comments regarding the US74 Relocation from Robbinsville to Stecoah, North Carolina also referred to as Sections A-9 B and C of Corridor K. These comments were originally submitted to NCDOT in 2008 in response to comments on the DEIS. My comments are based upon my reviews of the 1984 Final Environmental Impact Statement (1984 FEIS), the 2008 DEIS (Draft (supplemental) Final Environmental Impact Statement), several internal NCDOT memos, and a brief literature review. I am a concerned private citizen and I am not paid for this work. Please use these comments in your evaluation of this project, as they constitute a detailed description of the geologic hazards as they relate to water quality. In the bullets below I will summarize briefly my main concerns.

- It appears that NCDOT's analysis of geologic hazards including potential for acid-drainage and slope failure is largely absent. Both of these issues have strong potential for disrupting stream and ground water quality, as described in detail below. Despite several (NCDOT) internal memorandums in the late 1990s suggesting an intensive campaign of exploratory drilling was necessary to evaluate the subsurface geology with regards to acid drainage potential and orientation of bedding/cleavage planes with respect to the roadbed, no results of drilling were presented in the FEIS or DEIS, nor was a basic geologic map included. The DEIS does state that NCDOT drilled a number of borings but since no results are presented in the DEIS, this suggests that the basic information necessary to analyze impacts to water quality is not yet available or has not been analyzed.
- Despite indication that the roadbed will probably encounter acid-producing rocks in some locations, no mediation plan was presented to moderate either the acute effects during construction or the chronic effects following completion of the road. In fact, the potential for encountering acid-producing rocks was mentioned only once in the DEIS on page 4-29. This level of deficiency is not appropriate for a project of this scale with the potential to affect high quality headwater streams, numerous high-quality streams (some of which are trout streams) and residential ground water supplies.
- There is a large potential for the roadbed to encounter the potentiometric surface (water table) during construction of the tunnels, or in roadcuts if the tunnels are eliminated from the design. NCDOT did not discuss any potential meditative activities with regards to changes in stream or residential water supply quality or quantity.
- The rocks are near vertically-oriented in this area and as such will be very subject to slope failures during and after construction. The 1990s-era internal memos strongly recommended angled drilling methods to adequately examine the chemistry and stability of the rocks that will be encountered. Such drilling methods are very expensive, and the 2008 DEIS shows no evidence that such methods were used.

Together, the lack of effort put forth by NCDOT in evaluating these hazards suggests that they are simply not prepared to mediate the significant impacts to ground and surface water quality that would be a result of initiation of this project. I am shocked that a basic geologic map is absent. I hope that your organization will exercise the oversight necessary to ensure this project is completed without significant and long-term impacts to water quality and overall environmental degradation. In my opinion, the best way to ensure this occurs is for NCDOT to improve the existing 2-lane corridor, an option which is not under consideration in the DEIS. It does seem clear that the 4 very similar options examined in the DEIS are not the "least environmentally damaging" alternatives.

Thank you for your consideration of these comments.

DETAILED COMMENTS submitted to NCDOT during comment period for the 2008 DFEIS

I have a PhD, MS, and BS in Geology and am currently employed as a research scientist. My specialty is in hydrology, geochemistry, and contaminant transport. I am concerned that the Draft Final EIS (DEIS) referenced above is deficient in all areas of geologic investigation. The DEIS therefore does not provide sufficient information to determine either potential hazards associated with road construction, or potential mitigations that might be proffered before, during, and after construction. It therefore does not meet the obligations implied by and required by the EIS process.

The extreme deficiency of the DEIS is best illustrated by the absence of a basic geologic map showing the location of different geologic units with respect to the roadbed. This is standard practice for an EIS. Such a map would provide essential information including the specific geologic formations and their descriptions, the orientation of bedding within each particular geologic unit, the location and orientation of small- and large-scale folds and faults that offset the bedding, and the location and orientation of any local- or regional-scale joints or lineations that cross the area. This very basic level of information, that again I note is <u>entirely</u> <u>absent</u> in the DEIS, would facilitate discussion of the two very serious geologic hazards associated with the construction of the road – 1) the risk of slope failure due to movement along bedding, folds, faults, joints, and soils, and 2) the geochemistry of the rock formations and the potential for acid drainage. The discussion of these issues and the pertinent supporting information, e.g., scientific references, preliminary geologic investigations, and published maps, is entirely absent from the DEIS. These are both serious issues given what is known about the area geology and the route of the roadbed. The roadbed plan is terribly ambitious, involving a half-mile-long tunnel, a traverse through mountains of 3000-5000' elevation, steep natural slopes of up to 30%, unstable colluvial and alluvial soils, vertically-oriented rock formations, significant folds and faults, and sulfide-containing rock formations. The results of inadequate advance analyses of these geologic issues could include massive cost overruns, time extensions, landslides, stream and groundwater acidification, fish kills, loss of rural water supplies, and risks to worker safety during construction. I will discuss the two major problems in the order of 1) slope stability, and 2) acid-drainage potential.

1. Slope Stability

The problem of slope stability, in particular, was mentioned in the 1984 FEIS, e.g., "all of the alternates have the potential for serious stability problems" (FEIS, 1984). A 1995 memorandum (Acker and Reed, 1995) discusses the geologic hazards of the proposed roadbed, including a large-scale fault of up to 3000 feet of offset and a zone of deformation that is 5000 feet wide at Stecoah Gap (Brown et al., 1985). This fact is not mentioned in the 2008 DEIS. The bedding in the zone of deformation could be irregular, weathered, and would probably be subject to more slope failure than the rocks outside of the zone of

deformation. The history of landslides on NC143 near Stecoah Gap is known (Acker and Reed, 1995), but is not mentioned in the DEIS. This is particularly important given that NC143 is the approximate location of the proposed half-mile-long tunnel. In addition, the bedding planes of rocks are oriented nearly vertically (Power and Forrest, 1971; Acker and Reed, 1995), and as such, may be sensitive to failure along those bedding planes [DEIS, p 2-15]. This potential is hardly mentioned in the DEIS, rather, there is much focus on the stability of the overlying colluvium/alluvium (see below). In order to fully evaluate the hazards due to dipping rocks and the large fault gouge (i.e., weathered zone), the orientation of the bedding and any faults need to be mapped in great detail with respect to the proposed roadbed. Without a detailed preliminary investigation, road cuts may undercut geologic formations resulting in long-term instability of the rock bedding. The area is extensively forested and rock outcrops are relatively few, consequently in the past it was recommended that angled exploratory boreholes be drilled to determine the extent, orientation, and characteristics of the relevant geologic formations. In other words, it was thought that surface mapping was not sufficient to determine the specific location of the roadbed. The necessity of borehole sampling was mentioned in both Acker (1997) and Acker and Reed (1995) memorandums, but on the basis of the information presented in the 2008 DEIS, I can only assume that these exploratory boreholes were either not drilled or not analyzed. These two sources each recommended angled drilling because vertical drilling would not intersect multiple geologic formations due to the vertical orientation of the rocks (Acker and Reed, 1995; Acker, 1997). Because of the lack of relevant geologic information in the DEIS, it is impossible to judge the short- or long-term geotechnical stability of the proposed road and tunnel.

In addition to rock stability, there is the issue of soil stability which is discussed in some detail in the DEIS. Again, however, the DEIS is deficient in that the zones of colluvium (remobilized, reworked, and redeposited residuum) and alluvium (*in situ* weathered bedrock) and their relationship to the roadbed are not shown in a series of detailed, field-validated maps. This is particularly important because slope failure often occurs at the interface between colluvium and alluvium, and/or between colluvium/alluvium and underlying bedrock. This is discussed in the DEIS [DEIS p 2-15], but because it is without reference to a colluvial map showing the extent of colluvium and the interplay between topography and colluvium, the discussion does not realistically evaluate the hazards or the potential solutions. On page 2-14 it is claimed that there were preliminary geotechnical investigations, but since no results are shown, it is impossible to evaluate these claims or the proposed mitigation efforts discussed in the DEIS.

The DEIS does state that the "rock type, degree of weathering and discontinuity properties vary considerably throughout the project study area" [DEIS p 2-14]. Therefore, both geologic maps and weathered residuum maps should be overlain onto topographic maps, because slope failures occur where roadcuts intersect colluvium, bedding, and faults unfavorably. "Unfavorably" refers to locations where roadcuts undercut bedding, faults, or colluvium as to actually promote instability. This is particularly important considering that natural slopes may be as high as 30% (Acker and Reed, 1995) and the natural orientation of the rock bedding is nearly vertical, e.g., "predominant dip angle of over 60 degrees" [DEIS, p 2-15]. There is a large tendency for slope failure to occur on bedding planes (Acker and Reed, 1995), and due to the steep orientation of native rocks, slope failure may be significant in these locations *under natural conditions* (Acker and Reed, 1995), which will be greatly exacerbated in freshly exposed outcrops and in undercut sections. Acker and Reed (1995) also note that frost wedging, which tends to degrade rock stability, is much greater on northern versus southern slopes. Note that most of the proposed section is on the northern slopes of the mountains.

Due to its high elevation (3000'-5000'), this area of the Appalachians is subject to frequent and intense rainstorms, especially hurricanes. As noted in the DEIS, rainstorms in 1994 closed off access to

Robbinsville for several days due to slope failure along roads [DEIS p 1-9]. This new road is touted as possibly improving those conditions. On the other hand, if the geologic hazards of this road are not sufficiently evaluated and mediated, it is likely to suffer from the same problems as the current roads. They may in fact be exacerbated because of the huge footprint of this road (4-lane, divided highway with cut-back slopes and areas for accumulation of debris). Since large portions of this road cross high elevation mountains in which natural slopes and geologic bedding are at steep angles, it is very likely that severe slope failure problems will repeatedly occur. This is particularly true given the ambitious tunnel project. The building of a road in most cases in the Appalachians is merely a first step in mediating the geology – the second step will involve continual and repeated maintenance. In addition, if the geologic formations are capable of producing acid drainage, as discussed below, slope failure problems will also induce stream water acidification. In addition, colluvium and alluvium are also potential contributors to acid drainage, depending on their degree of weathering. Because the geologic hazards are not adequately presented and evaluated in the 2008 DEIS, it is completely uncertain as to whether the costs associated with road construction and maintenance account for mediating these potential problems in either the short or long term.

2. Potential for Acid Drainage

The 1997 memorandum (Acker, 1997) mentions outcrops of the Ammons Formation on NC143 containing significant concentrations (several weight percent) of sulfides and graphite. This is not discussed in the 2008 DEIS to any extent. A 1997 memorandum (Acker, 1997) suggests that the proportion of acid-producing rocks in the study area might be 50%, and where the Nantahala Formation is encountered the proportion of acid-producing rocks might be 80% (Acker, 1997). Sample analysis in Acker and Reed (1995) indicate minimal acid-producing rocks, but they appear to have analyzed only 7 samples from Sections B&C. The DEIS however, fails to mention possible impacts to Water Quality from anything other than "hydrocarbon pollutants, and, in winter, probably road salt and sand". In fact, the word "acid" is only mentioned once, on page 4-29. No discussion of engineered or remedial actions (e.g., Appendix B, 2003) was associated with this one mention of the word "acid". Because no geologic maps or sample analysis is presented in the DEIS, the following discussion is based on a brief literature review. It is important to remember that the extent to which these hazards could occur is uncertain due to the lack of information in the DEIS.

The road traverses a major mountain range where the section cuts through the older units of the Murphy Syncline (Power and Forrest, 1971), a large-scale regional fold. In the section of the project that the DEIS covers, the Dean and Ammons Formations of the Great Smoky Group are mostly encountered [DEIS p3-133], of which the Hughes Gap, Hothouse, and Grassy Branch Formations are a part [DEIS p3-66] (Kish et al., 1975; Brown et al., 1985). These are described in various publications as being composed of metagraywacke, metasandstone and metasiltstone with interbeds of marble, phyllite, and argillite (Powers and Forest, 1971; Kish et al., 1975; Brown et al., 1985). These are not the sulfide- and graphite-bearing rocks of the Anakeesta Formation, which was the major source of acid-producing drainage in the proposed Northshore Road in the Great Smoky Mountains National Park. However, Acker and Reed (1995) mention that the Horse Branch Member of the Ammons Formation contains a "large component of dark gray sulfidic and graphitic (acidic) schist" (Wiener and Merschat, 1992). Acker and Reed (1995) also mention encountering pyrite and/or pyrrhotite in the Ammons Formation at concentrations up to several percent in the roadcuts of NC 143 at Stecoah Gap. They go on to mention finding argillite and phyllite near Stecoah Gap that contain more and less sulfidic concentrations. This is of concern here because graphite, pyrite, pyrrhotite, and dark, fine-grained rocks may be capable of dissolving and releasing acid and metals into area streams (and also are more subject to slope failure). Acker and Reed's (1995) geologic log of the Ammons Formation outcrop shows significant portions of

fine-grained phyllitic rocks, which may or may not contain acid-releasing components. The lack of a geologic map and exploratory boreholes again prevents the 2008 DEIS from adequately identifying or planning for mitigation of these potential hazards.

Further, the section at Stecoah Gap probably encounters the Wehutty Formation, which is described as "consisting of dark gray slates and schists" [DEIS p3-66] (FEIS, 1984; Brown et al., 1985). The tunnel area may encounter a significant fault wherein the Ammons Formation and Wehutty Formations are offset by 3000 feet (Kish et al., 1975; Brown et al., 1985; Wiener and Merschat, 1992; Acker and Reed, 1995). It is very notable that in Kish et al. (1975), the Wehutty was provisionally mapped as the Anakeesta Formation, or as an "Anakeesta-like geologic unit" since it contained several percent of sulfides. This was actually discussed in the 1984 FEIS when the unit in question was referred to as the Anakeesta. The potential for generating acid drainage from building a half-mile long tunnel through this Formation, therefore, is possibly significant, but it is not mentioned in the 2008 DEIS.

On page 4-29 of the DEIS is the only place where the potential for acid drainage is even discussed, stating that "acidic inputs are substantial concerns in all of the watersheds crossed". But no published strategies are discussed to mediate acid drainage (e.g., Appendix B, 2003), and the potential for the geology to generate acidity is also not discussed. So it is hard to reconcile that these "substantial" concerns are seriously considered in this DEIS. Although these geologic Formations may be primarily composed of relatively harmless (from a geochemical standpoint) rocks such as metasandstone, marble, and metasiltstone, it is typical that such lithologies will be interbedded with fine-grained phyllite, argillite, graphite and metagraywacke. These lithologies are the ones that promote the greatest risk for acid drainage because they contain low concentrations of metals and sulfides. The steep natural slopes of the area (up to 30%) clearly indicate that the area is underlain by fine-grained rocks. In my own personal experience, I observed that the rocks of Stecoah Gap and Cheoah bald are primarily fine-grained, dark-colored phyllites and argillites. These are the type of rocks that may have acid-producing potential.

In addition, information on the location of the water table (potentiometric surface) should be overlain upon a geologic map, a topographic map, *and* a map of the proposed road. This is particularly important because the tunnel through Stecoah Gap will be either 577' (2870 feet long) or 427' deep (1919 feet long). Undoubtedly, such a tunnel would encounter groundwater and would also have the potential to encounter (or even *create*) prominent discharge points such as springs. It should be noted that in the Appalachians, there is often an excellent correlation between structural gaps (e.g., Stecoah Gap), faults, joints, and springs. If such a discharge point were encountered, significant and costly measures might be required to divert the water. If the water constituted a major aquifer, then local residents' drinking water could be impacted. If the water were also in contact with fresh rock capable of producing acid drainage, then these problems would be greatly compounded. The DEIS does note in several places that residents' groundwater supplies may be negatively impacted by the construction of the road. However the DEIS does not provide any specifics about the potential for impacts or any resolution for the impact upon rural residents' drinking water sources. Such impacts could devastate rural communities that depend upon groundwater aquifers for their drinking water, as well as the acid balance in local streams.

The preparers of this DEIS should refer to the Northshore Road EIS for guidance on the needs of an EIS in the Appalachian Mountains. The area in question here is just as sensitive as that of the Northshore Road in terms of its geology and environment. Cheoah Bald is a national treasure. Two major trail systems run through these mountains, the Bartram and Appalachian trails. The proposed road will impact the views and scenery from these areas. The lack of consideration given the imposing geologic issues associated with construction of the road and the associated half-mile-long tunnel in this DEIS is truly

surprising. This road, unfortunately, has the potential to become a boondoggle unless the geology of the area is considered and adequately mediated.

Finally, the project is very narrowly defined as to include only the B and C sections. This excludes the section through the Snowbird Mountains southwest of Robbinsville US74 to the connection with US129, referred to as the A section. But the B-C sections are nearly useless from a transportation standpoint without completion of the A section. Construction of the B-C sections will later be used as support for construction of the A section, just as construction of the NC-28 section east of Stecoah (Section D) is used in the current DEIS to force the construction of the B-C portions. On page S-3 of the DEIS, it is stated that "[the Improve Existing Alternative] would not connect to the D section of the A-9 project, which has been completed; therefore, it is not consistent with current transportation plans". The risk of exposing pyrite- and pyrrhotite-containing rocks in Section A is huge because the road runs through the Nantahala and Brasstown Formations. The Nantahala Formation and Brasstown Formations of the Hiwassee Group (Brown et al., 1985; Aylor, 1991; Tull et al., 1991) immediately overlie the Great Smoky Group, of which the Dean and Ammons are members. The Nantahala and Brasstown Formations have significant potential for producing acid drainage and may contain sulfides up to several weight % (Kish et al., 1975; Aylor, 1991; Tull et al., 1991). Further, the A section also has a very large tunnel, again through potential acid-producing formations. It is disingenuous to exclude consideration of the A section in order to minimize risk in the B-C sections, particularly when they are all necessary to produce the final finished product. As discussed on p1-8 of the DEIS, "The decision to postpone reevaluation of Section A based on environmental and budget concerns". More detail is provided on p1-14, "In 1998, the decision was made to re-evaluate A-9 A and A-9 B&C as two separate studies so that environmental studies for the B&C sections could move forward." This was due to "potential impacts to historic resources, fragmentation of wetlands and undisturbed forest habitat, impacts to surface waters, trout habitat loss, and the presence of anakista (sulfide-bearing) rock" [DEIS p1-14]. Please note that "anakista" is both misspelled and mis-interpreted. The correct spelling is "Anakeesta", and it is a specific geologic Formation. It does not mean that all sulfide-bearing rock is of the Anakeesta Formation, or that only the Anakeesta Formation is capable of producing acid drainage. These misspellings and misstatements certainly suggest that the writers of the DEIS are not knowledgeable regarding geology and are apparently not qualified to evaluate the geologic hazards associated with construction of this section of the road.

Overall, I question the need for such a road. If the development is "largely confined to valleys" [p1-10], the "promotion of Graham County as an eco-tourism destination" is the primary development trend in the area [p S-6], and "Appalachian Trail users would see glimpses of the highway from numerous locations north and south of Stecoah Gap and at least five viewpoints would have unobstructed views of the project. Visual impacts to the trail would be greater during the leaf-off season" [pS-11], it seems the road works against ongoing and future trends for commercial development in the area.

The risks of initiating construction in such challenging geology and topography are huge, in terms of cost overruns, worker safety, water supply, and slope failure. Such construction should only proceed once the best available information is compiled and reviewed to determine the cost and feasibility for construction and long-term stability. Unfortunately, this DEIS does not present the best available geologic information and therefore does not adequately evaluate or mediate the geologic hazards.

Sincerely,

Melanie A. Mayes, PhD

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Appendix B. Proposed plan for handling acid-producing rock. 2003. Draft Environmental Impact Statement and Draft Section 4(f) Evaluation, Appalachian Development Highway System Corridor K (Relocated US 64). FHWA-TN-EIS-03-01-D.

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