

Comments of the Proposed Rail Line from Port MacKenzie, AK

written by

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General Comment on the Detail of Engineering Analysis within the Documents

I would first like to describe the lack of engineering analysis presented within the documents describing the proposed rail line that was available to the author.

Engineering is an art that requires at least two essential parts: 1) preparing a design capable of performing adequately while protecting the public and environment, and 2) writing-up and presenting said design in such a manner that another person trained in the art of engineering can validate the design to ensure it will perform adequately and will protect the public and environment.

This second clause (the presentation of the design) is generally lacking from the Final Environmental Impact Statement (FEIS) and the Public Notice of Application; therefore, it is impossible for another person trained in the art of engineering to validate the quality of the work and whether or not the implementation of the design would protect the public and the environment. When no real design has yet been made, it is difficult to compare scenarios. In many instances the reader is simply told that the design will be done in the future. Such an approach does not allow the public proper access to examine the probable outcomes of any resulting design before accepting the consequences of their choice.

Detailed comments:

On the “Design” of Culverts...

Although 100 Culverts have been sized for the preferred route, the background information used to size said culverts was not provided, and therefore their efficacy towards eliminating the negative hydrological effects of the rail line cannot be determined. Further, no alternative plan, other than culverts, was presented. So the public has no evidence as to whether the culverts might work, or if another approach (e.g., an elevated line), might be a more suitable approach.

1. page 6 of the Project Plans (Culvert Detail Table) located here: http://www.poa.usace.army.mil/reg/PN_Scanned/2011%20May/POA-2007-1586-Project-Plans.pdf, shows exactly 100 culverts for the preferred route
 - a. When a person views the Culvert Detail Table, the first thing that becomes obvious is that about ½ of the table is populated with “XX” (null values), which apparently represent either unknown or unreported values. These “XX” values stand-in for important variables such as: culvert pipe length, the inlet and outlet culvert elevation (allows for determination of gradient), and height of cover.
 - b. Although the Culvert Detail Table is missing many of its values, pipe diameter (which is dependent on the other values), is present for every single culvert. Further, there are several other columns which should be provided in this table including:
 - i. Area drained
 - ii. Average annual precipitation
 - iii. Percent storage area

This Table represents a completely unsupported approach towards describing the systems hydrologically. As such, it bears no weight towards describing the impacts of the rail line on the wetlands. It appears to be merely a crude guess of one approach towards allowing water to pass beneath the rail line.

Wetlands are difficult places to place significant structures while maintaining environmental integrity. Wetland surfaces are generally very compressible, and they are flat with poor drainage. The proposal amounts to removal of the compressible surface media and replacement with more stable media and ballast, forming a raised rail bed in a direction generally perpendicular to the hydrologic gradient. This rail bed therefore forms an impoundment within the wetlands for both surface flow and shallow sub-surface flow. To allow water flow across the impoundment, culverts would be placed periodically. This in essence cuts the large original wetland into two smaller wetlands connected serially by multiple culverts. Given that the entire basis for wetland management is the control of the probabilistic distribution of inundation depth (Somes and Wong,

1997), simply placing multiple corrugated pipes to connect the two sides of the rail line is an overly simplistic approach.

In nature, running water is almost always in the process of becoming more concentrated: running from small ditches and culverts, to larger creeks, to larger rivers and lakes, to the ocean. These culverts would concentrate flow unnaturally on the down gradient side of the rail line as water passes through the culvert instead of through a much larger cross sectional area occupied by the rail line. During extreme hydrological events, the velocity through the culverts would be quite high, and would likely scour the culvert outlets, making drainage ways through the once former wetland that would not otherwise be present.

Elevating the rail line above the wetland, although likely more costly, would avoid many of the hydrological problems described above. But because only the culverts approach was presented (and in a very preliminary manner at that) one cannot evaluate the pros and cons of different approaches to traversing the wetlands.

The reviewing body only considered the effect of 19% of the proposed culverts.

Page 2 of FEIS Summary of OEA Conclusions states, while comparing this route to alternative routes, "...and one of the fewest numbers of proposed culverts (19 versus 17 to 33)." This statement is in conflict with page 6 of the Project Plans (Culvert Detail Table) located here: http://www.poa.usace.army.mil/reg/PN_Scanned/2011%20May/POA-2007-1586-Project-Plans.pdf, which shows exactly 100 culverts. Attempting to compare the number of water crossings when only 19% (for the proposed route) of the culverts are included does not seem to be a solid approach.

One of the most sensitive issues, hydrologically, is placing the rail line through the wetlands, yet the design of the drainage system is not presented.

The 3rd paragraph of section 4.2.2 of the FEIS, states, "*Crossing structures would consist of bridges, culverts, natural bottom plate or pipe arches, and other drainage structures. Crossing structures identified as "drainage structures" **would be determined by the Applicant during the final design process** and could include multi-plate culverts, pre-cast arches, and single or multiple short-span bridges.*"

What this says is that the applicant will figure out how to handle most of the water crossings, and almost all of the numerous water crossings within the wetlands, after they receive approval for their railroad project. Another possibility is the applicant already knows how they will handle all these water crossings, but they have not shared that information publically. In any case, this stance does not provide the public with a good faith estimate of the potential outcomes. Rather the public is being asked to have faith. Attempting to artificially replicate wetland hydrologic performance via culverts is not something that should be taken lightly, as described previously.

Based on the information within the public documents, I cannot say that I have faith in their plan, as their plan does not yet exist in any sufficient detail as to allow proper inspection.

On the Fish Crossings...

The fish crossings, being also water crossings, lack the same detail previously described as lacking for the culverts, and therefore their performance as serving the mobility of fishes cannot be discerned.

- 1) The Project Plans document posted on the public notices website <http://www.poa.usace.army.mil/reg/PNnew.htm> includes drawings for fish crossings (figs. 18, 19, 24, 25, 26, 27). Yet as noted before, the hydraulics behind the designs are unknown and cannot otherwise be estimated by me because the relevant data have not been presented.
- 2) The fish crossings are also discussed in Appendix F of the FEIS (Table F-6)
 - a. At the top of page 4 of this document the reader is asked to see Section 4.2 of the FEIS for the relevant input data.

“All of the models used in the analysis were populated using geomorphic information such as accessible watershed size, stream gradient, stream order, or other surface water information (see Section 4.2)”

Yet upon viewing Section 4.2, only the nine larger watersheds are described qualitatively along with their respective areas. There is no information pertaining to the specifics of the sub-watersheds necessary to validate the sufficiency of the water crossings in terms of hydraulic failure, much less whether the resident and transient fish will be satisfied with the hydraulics of the situation. One would require the sub-watershed data (watershed area, annual precipitation, %pond, slope, etc.) to estimate: peak flows, low flows, slopes of culverts, etc. This information simply isn't provided so I cannot validate whether the fish crossings would have a good chance of success or not.

Summary

The documents describing the proposed routes and their environmental impacts are preliminary to the point of having little value. In many cases the planning and design have not yet been conducted, making an evaluation of the potential environmental outcomes impossible. Although the authors can make charts and evaluate comparatively the environmental impacts between various routes (based on for example the length of wetland crossed or the number of culverts) this type of analysis has no validity towards comparison with the null option of not building the rail line. To make a fair analysis against not building the rail line, then one must have a

reasonably good expectation of the real environmental damage that will occur. For example, if one believes routing through the wetlands will be difficult causing significant environmental damage, and one only considers the different routes proposed, then it is obvious that selecting a route with minimal wetland exposure is preferable. This simplified scenario minimizes the difficulty of selection by assuming that one of the routes will be selected. But if one wants to compare the same setting (environmental damage from routing through the wetlands), with the null option of not building the rail line, suddenly the magnitude of the environmental damage and the accuracy of that assessment becomes critical to the evaluation. It is no longer good enough to say that the proposed route with the shortest wetland stretch is best, one must at this point defend that they are not going to cause great harm to the wetlands before the proposal becomes tolerable.

The documents can be used to make very simplistic comparisons of the relative merits between the alternative routes. But the documents are completely unsatisfactory towards describing the environmental damage that could occur from selecting any of the proposed routes.

Reference

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Education and Training

Oklahoma State University	Biosystems Engineering	Ph.D. / 2001
San Diego State University	Geology (hydrogeology option)	MS / 1998
University of Oklahoma	Geology	BS / 1990

Research and Professional Experience

2007-present	Associate Professor, University of Tennessee
2001-2007	Assistant Professor, University of Tennessee
1998-2001	Research Assistant, Oklahoma State University
1996-1997	Assistant Geoscientist, McLaren/Hart Inc., Irvine, CA
1995-1996	Hydrogeologist, Aqui-Ver Inc., San Diego, CA
1991-1993	Naval Officer, USS COPELAND (FFG-25), San Diego, CA

Synergistic Activities and Awards

- 2010 Agriculture College teacher of the year award for Univ. of Tenn.
- Jointly received the national EPA award for the Most Environmentally Beneficial Best Practice. This award was delivered at the National Environmental Partnership Summit for an environmental audit of the Pigeon River, North Carolina. The work was conducted jointly with UT's Dept. of Forestry, Wildlife and Fisheries, and ORNL
- Received the Gamma Sigma Delta Team Award of Merit for work on an environmental audit conducted on the Pigeon River, North Carolina
- Chair of the local Stormwater Advisory Committee, which provides guidance to the town of Farragut, Tennessee on stormwater best management practices
- Past Chair P-121 (G. B. Gunlogson Student Environmental Design Competition, which directs the Student Fountain Wars Competition and the Open Competition at the Annual ASABE meeting)
- Mentor the U. of Tenn. undergraduate student section of ASABE to compete in the annual fountain wars competition.
- Past President of TN Section of the American Society of Agricultural and Biological Engineers.
- Teach three sections per year including: Environmental Hydrology, Physical Phenomena, and Engineering Design.
- Member - American Society of Agricultural and Biological Engineer (ASABE)
- Member - American Geophysical Union (AGU)
- Registered Professional Engineer (PE) Texas Inactive
- Registered Professional Geologist (PG) Tennessee Inactive

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