

May 12, 2023

Mr. Tim Carr, Senior Planner
Maine Land Use Planning Commission
22 State House Station
Augusta, ME 04333-0022

Re: Third-Party Review of the Pickett Mountain Metallic Mine Sound Assessment

Dear Tim:

Tech Environmental, Inc. (TE) has completed a third-party review of the Pickett Mountain Metallic Mine Noise Assessment Report prepared by Wood VDN (Wood) on behalf of their client Wolfden Mount Chase, LLC (Wolfden), and dated October 12, 2022. The Wood report is Attachment 16-B to the January 18, 2023, LUPC Application for Zone Change to Planned Development (D-PD).

Review Standard and Decibel Limits

The purposes of this review are: (1) to determine whether it is reasonably accurate and technically correct according to standard engineering practices, (2) to determine if the petitioner has demonstrated the proposal has a reasonable likelihood of complying with the Commission Rules 01-672 Chapter 10, Section 10.25, F, Noise and Lighting, resulting in no undue adverse impacts to existing uses, and (3) to determine if the petitioner has demonstrated the proposal has a reasonable likelihood of complying with DEP's Chapter 375.10 Rules, Control of Noise.

DEP's Chapter 375 regulations set an hourly sound limit of 75 dBA for the property lines of the development, and sound limits for any nearby Protected Location (including seasonal residences), depending on zoning, land use, and pre-existing sound levels. In a quiet rural area, Protected Location sound limits are 55 dBA daytime and 45 dBA at night. Locally designated recreational areas are subject to daytime sound limits. The sound level limits set in the LUPC Rules for a D-PD District are listed "As determined by the Commission." LUPC sound limits in other districts range from 55 to 70 dBA daytime, and from 45 to 65 dBA at night. The Wood report uses the DEP sound limits as the set of those likely to be selected by the Commission for this application, which is reasonable, and concludes the project site is in a quiet area and thus nearby protected Locations have sound limits of 55 dBA daytime, and 45 dBA nighttime.

The Applicant’s Sound Source Inventory

Pages 2 and 3 of the Wood report list the above-ground, outdoor sound-producing sources, along with the expected sound power levels of each piece of equipment. For the proposed mining operation (24 hours/day) and proposed production rates, this is reasonable and complete sound source inventory. The sound power levels are referenced to several sources: manufacturer’s data, the RCNM User’s Guide for construction equipment, and the ASHRAE Handbook. All sound power numbers were checked and found to be reasonable. The loudest sources are the two generator sets and two mine ventilation fans. The applicant has confirmed that all mined ore rock crushing will take place underground and thus a rock crusher is not included in the above-ground sound source inventory.¹

The Applicant’s Receptor Inventory

Pages 3 and 4, and Figure 1, of the Wood report present the 14 discrete receptor points used in the sound assessment. These include the nearest residential properties with seasonal dwellings on the south and north shores of Pleasant Lake, the nearest daytime recreational land uses, primarily ponds and lakes (Pickett Mountain Pond is the closest recreational use), and the project property lines in the four cardinal directions. The receptor set is reasonable and includes the locations where maximum sound impacts would occur. Sound levels were predicted at all locations within approximately three miles of the mine because the acoustic modeling included a finely spaced grid of additional receptors.

Acoustic Modeling Methodology

Sound levels from the mining operation were predicted using the Cadna\A acoustic model, corresponding to the International Standard ISO 9613-2 sound propagation method. The modeling assumed all sources were operating simultaneously, and accounted for the effects of source directivity, terrain, and sound attenuation with distance, air absorption and ground absorption. This is the proper tool for accurately evaluating sound impacts.

The Wood report does not list the Ground Factor G assumed in the Cadna\A model run. An overall assumption of G=0.5 (mixed ground conditions), and G=0 (hard ground surface) for the active mining area would be appropriate in this type of sound assessment. We do not know the actual assumptions made by Wood in the model. In the worst case, if they assumed an overall absorptive surface (G=1), it is possible that sound levels were under-estimated by 1 to 2 dBA. We also note that the modeling results do not include a sound power level uncertainty factor, and a typical uncertainty assumed in most such sound assessments is 2 dBA. Thus, in evaluating the reported model results, the possibility exists that the reported sound levels should be 3 to 4 dBA higher than what is listed in Table 6-1 of the Wood report.

¹ Wolfden, “Response to LUPC Comments of February 24, 2023,” Rock Crushing/Milling, April 13, 2023.

Acoustic Modeling Results

The predicted sound levels at the residential, recreational and property line receptors are presented in Table 6-1 on page 6 of the Wood report. The highest predicted sound level at a residential location is 34 dBA daytime and 33 dBA nighttime (dwelling on the northern shore of Pleasant Lake), which are 21 dBA below the daytime sound limit and 12 dBA below the nighttime sound limit for a quiet residential area. The highest predicted sound level at a recreational receptor is 47 dBA (Pickett Mountain Pond), which is 8 dBA below the daytime recreational sound limit of 55 dBA. The highest predicted property line sound level is 44 dBA (east property line), which is 31 dBA below the property line sound limit of 75 dBA.

Whereas all predicted sound levels at the receptors are at least 8 dBA below the applicable sound limits, even if 3 to 4 dBA are added to the results to account for possible uncertainties regarding sound power levels and the modeling assumptions, the resulting worst case sound levels are still below the sound limits. Thus, we concur that the modeling results presented in the Wood report demonstrate the Project operations are expected to meet applicable LUPC and DEP sound limits for both daytime and nighttime periods.

Conclusions

We conclude that the Wood sound assessment: (1) is reasonably accurate and technically correct according to standard engineering practices, (2) the petitioner has demonstrated the proposal has a reasonable likelihood of complying with DEP’s Chapter 375.10 Rules, Control of Noise, and (3) petitioner has demonstrated the proposal has a reasonable likelihood of complying with the Commission Rules 01-672 Chapter 10, Section 10.25, F, Noise and Lighting, and will result in no undue adverse impacts to existing uses.

Please call if you have any questions.

Sincerely yours,

TECH ENVIRONMENTAL, INC.



Peter H. Guldberg, INCE, CCM
Senior Consultant
4575/Letter Report May 12, 2023



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TECHNICAL MEMORANDUM

To: Stacie Beyer, Executive Director, Maine Land Use Planning Commission
22 State House Station
Augusta, Maine 04333

From: Andrew Harley, PhD, Client Services Director – Mining, SWCA Environmental Consultants

cc Tim Carr, Senior Planner, LUPC; Michael Lychwala, SWCA Environmental Consultants

Date: May 24, 2023

Re: **Preliminary Review of September 2020 Update Letter to PEA Report, Picket Mountain Project, Penobscot County, Maine. SWCA Project No. 00061402-000-PTL**

INTRODUCTION

SWCA Environmental Consultants (SWCA), on behalf of the Maine Land Use Planning Commission (LUPC), has previously evaluated a Preliminary Economic Assessment (PEA) for the Wolfden Resource Corporation (Wolfden) Picket Mountain Project in Penobscot County, Maine, USA (Project), dated October 29, 2020. Following a subsequent filing by Wolfden on January 18, 2023, LUPC has requested that SWCA review Attachment 14-B of that document to evaluate the updated economic model that provided for the following:

- Relocating the processing plant and tailings facility to an off-site location.
- Cost estimate for a second water treatment plant.

SWCA RESPONSE

The following responses are made to each of the items within Attachment 14-B:

- a. Assumption of capital costs being the same are adequate as the facility will be within the general region of the mine. Construction costs are considered to be the same within a particular region.
- b. Haulage costs are required and are based on a quote provided by a third-party contractor. SWCA has not seen the actual quote, however, costs are within a reasonable range.
- c. Costs for a second water treatment plant have been developed as two, standalone facilities. Both water treatment plants are fully staffed and run independently without considering any savings that may be associated with a combined team running both plants. As such these costs are likely to be conservative. The costs were provided by a third-party quotation that has not been verified by SWCA.

- d. Spray irrigation costs are well established and SWCA assumes that these costs, provided by third-party, are reasonable, although not verified.

SWCA has not been provided with the actual economic calculations for this review. The additional costs are relatively minor and less than 10% of the original economic model, which has an overall accuracy of $\pm 40\%$. As such the additional costs are within the accuracy of the model and considered reasonable for the level of analysis during this preliminary review. If required, SWCA is able to provide a more detailed review of supporting data behind the PEA.

MEMO

To: Tim Carr, Senior Planner, LUPC

From: David P. Rocque, Soil Scientist # 181, Consultant

Re: Pickett Mountain Mine, ZP 7794, Soil Suitability Review

Date: June 6, 2023

This is in regard to my review of the subject application concerning soil suitability for the proposed metallic mineral mine. I understand the applicant is proposing a mining operation in an area not currently zoned by LUPC to allow such a use and is therefore applying to have the area rezoned. My comments are based upon both the application materials and a site visit conducted late last fall.

General Comments:

Soil suitability for most development projects is based on three primary factors: soil wetness (groundwater hydrology), steepness of slope and depth to bedrock. In the case of a mining operation that requires extensive blasting of bedrock to obtain the desired material to process, depth to bedrock is not a significant limitation. In fact, blasted non-reactive rock is sometimes a desired product for use in other activities associated with the mining operation. Therefore, my comments will be limited to soil wetness and slope.

Though I did not have a high intensity soil survey to base my comments on, I did have a general soil assessment, prepared by Maine Licensed Soil Scientist, Roger St. Amand, and a site visit late last fall. Mr. St. Amand was of the opinion that the soils in the project development area were higher in clay content than indicated by NRCS soil scientists, which I agreed with. It is not unusual for soil scientists today to make different determinations than NRCS did when they did the field work for County Soil Surveys. That is because most of the original soil mapping was done 50 – 75 years ago and soil series concepts have changed over time. In fact, there are newly created soil series in use today that were not established back when this field work was done and some soil series have been dropped from the list of those recognized in Maine.

In contrast to the first application for the subject project, this application, for the most part, is proposing to site facilities on soils that are generally suitable for development. The one exception is for part of the proposed site for the Waste Rock Storage Pad #1, which will be on soils indicated by Mr. St. Amand as being somewhat poorly drained and which are oxyaquic (wetter than can be determined by soil morphology and plants). The applicant's intent to site actual processing facilities elsewhere as well as the Tailing Management Facility significantly reduces the potential impacts on the area requested to be rezoned. It should be noted that some of the proposed facilities for this project may actually be sited on less suitable soils than indicated by the general soil assessment and vice versa. These would be considered to be inclusions which would be identified by a more detailed high intensity soil survey.

Specific Comments:

My primary concern with this proposed project is with the potential for significant alteration to the natural hydrology. It is my understanding that the applicant is proposing to restore the site as close as possible to the condition in which it was prior to development. That would include restoring the natural hydrology which is important for downgradient wetlands and waterbodies but is also important for non-wetland soils. The applicant is proposing cuts as deep as 13 feet which will be well below the seasonal groundwater table and will require blasting of bedrock in many instances. It will be difficult to restore the natural hydrology when you excavate below a hardpan and/or bedrock. I also am concerned about the daily blasting of bedrock in order to remove mineral rich deposits for processing. This blasting will likely result in opening new fissures in the bedrock in surrounding areas and may close off others. I am not an expert in deep groundwater hydrology but recommend consulting others who do have expertise in this area to comment. I do though, have experience in shallow groundwater hydrology (upper 6 feet of soil) and realize that blasting can open up fissures in the bedrock of surrounding areas causing them to drain more quickly while sealing off others, making those soils wetter. If any of the wetlands are bedrock controlled, which I suspect they are, fractures may open up draining them. This possibility should be considered.

In order to minimize significant, permanent, alterations to the natural hydrology from deep cuts proposed for many of the pads and water treatment ponds, I suggest a combination rock sandwich/rock cannoli approach. I suggested its use for the Kibby Windfarm substation on Kibby Mountain and it has worked quite well. Where there is a proposed deep cut, below the groundwater table, use a rock sandwich on the cut face and downslope fill face with rock cannoli's (or a continuation of the rock sandwich) installed below the pad or pond liner system. This will ensure that the groundwater upslope of the facility will be re-introduced below the facility in as natural a manner as possible. It will also provide a much more stable surface to work on when constructing the liner system and the pad or pond. Otherwise, it will likely be wet and possibly soft unless dewatered.

I would also suggest a modification to the applicant's proposal to construct roads over "poor soils". Their proposal is to remove the poor soils and replace them with coarse granular fill (gravel). I do not remember ever seeing that approach to building a road over wet ground. That would alter the natural hydrology and create a curtain drain below the roadbed. I recommend using a rock sandwich to cross wet soil areas where the groundwater and/or surface water is moving from one side of the proposed road to the other. If the area is flat with no groundwater flow direction, the ground should be reinforced by using filter fabric. If the wet area to be crossed is bouldery, rocks can be placed in between the natural rocks and then filter fabric placed on top of the rocks before road fill material is added. This would act like a more natural rock sandwich.

A second concern is with the potential for acid leachate from the mine itself to impact groundwaters and, eventually, surface waters down gradient. The proposed mine shaft will be over a half mile deep with a number of laterals. The shaft and laterals will allow for oxygen to be introduced to areas that are now anaerobic which may result in sulfur being oxygenated.

A third concern is with the possibility of reintroducing process water into the soil by means of a subsurface system, similar to a standard septic system. The applicant's current intent is to return treated water to the site by using spray irrigation and snowfluent, which, in my opinion, is a much superior approach to the original application's proposal to use plastic chambers. It would be very difficult (I think impossible) to install very large plastic chamber beds into a site with such high clay content soils and have them effectively infiltrate the water into the soil. The soil would be compacted and smeared in the installation process, severely limiting its infiltrative capacity. I believe the water would follow a sand layer below the chamber beds, down to the lowest row where it would surface. By using spray irrigation, the soil can remain relatively undisturbed, with intact vegetation, an organic duff layer and good soil structure (which would be destroyed by construction associated with installing the plastic chamber beds). I strongly recommend avoiding any subsurface reintroduction of the process water, that would require excavating into the soil.

A fourth concern is with the Ore Removal and handling process - The mineral rich rock (ore), some of which is acid bearing, is to be removed by front end loaders, loaded into trucks and then hauled up to the surface where it will then be transported to an off-site location for processing, with the tailings to be permanently stored in a secure landfill type structure. It is likely that at least some of the ore rock will be wet, being below the groundwater table, which means that leachate may be generated in the transport process. There will also be days when it rains (or snows which may melt), adding moisture to the loaded trucks, if standard dump trucks are to be used. If leachate is generated, it is likely that some will escape truck bodies as they haul the ore off-site to be processed. This leachate could be acidic and have a detrimental environmental impact on soils and waterbodies if it falls on them or reaches them in runoff. If the ore is dry, wind could carry reactive dust particles to local soil and waterbodies during transport impacting those resources. Will secure, water tight, dust tight, trucks be used to transport the ore off-site? This process should be more fully detailed to properly assess the potential environmental impact.

A fifth concern is with mine sump pit sediment removal and disposal - The application explains that groundwater will be managed in mines by collecting it in sump pits where the muddy water will be retained until its sediment can settle out and collect on the pit bottom. These sump pits will periodically have to be dewatered so that the collected sediment can be handled and transported to its final destination. The application indicates that this is a process that might have some difficulty with the dewatering aspect. If this sediment contains reactive ore material, it will generate reactive leachate that could have an impact on local soil and water resources during the transport process. According to the application, this sediment is to be deposited into active backfill areas or blended with waste rock fill. If this sediment is reactive, blending it with waste rock and using it as fill could cause groundwater to become acidic, impacting downgradient soil and water resources.

Let me know if you have any questions or would like clarification of any of the points I have made.



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207-272-8692

To: Tim Carr, Senior Planner at LUPC
From: Rachel Bouvier, rbouvier consulting
Re: Review of socioeconomic analysis, Wolfden Proposal
July 10, 2023

Background:

The Maine Land Use Planning Commission is responsible for planning and zoning within the unorganized and deorganized territories of Maine. The guiding principles of the Commission, found on its website, include the following (among others):

- To encourage appropriate residential, recreational, commercial and industrial land uses;
- To prevent residential, recreational, commercial and industrial uses detrimental to the long-term health, use and value of these areas and to Maine's natural resource-based economy; and
- To preserve public health, safety and general welfare (Land Use Planning Commission 2013a)

In accordance with these principles, Chapter 12 of the Commission's Rules governs metallic mining and exploration activities within the Commission's territory. Specifically, any requests for rezoning for these purposes must include a detailed description of socio-economic impacts resulting from those activities, including, but not limited to, "impacts to regional economic viability, Maine's natural resource-based economy, local residents and property owners, ecological and natural values, recreation, and public health, safety, and general welfare" (Maine Land Use Planning Commission 2013b).

In January of 2023, Wolfden Mt. Chase LLC ("Wolfden") submitted a rezoning petition to the Land Use Planning Commission. As their petition falls under Chapter 12, Wolfden was required to submit a socio-economic analysis to the Commission. Section 10.10 of Wolfden's petition (entitled Socioeconomics) is a summary of a socio-economic review of the Project (found in Attachment 10-A of Wolfden's petition), conducted by Stepwise Data Research. The purpose of this memo is to comment on the assumptions, variables, methodologies, geographic area studied, analysis, and conclusions contained in the socio-economic analysis.

Review of Wolfden's Socio-Economic Analysis:

In Appendix A, we list each requested item in the pre-application Scoping Document, its location within Wolfden's proposal (if addressed), the criteria included in the Scoping Document, and our assessment of the adequacy of the information given. By and large, the information requested is complete, with a few exceptions (highlighted in Appendix A). The remainder of the memo is structured as follows: a review of the data used in the socio-economic analysis, a commentary on the methodology employed, a definition of terms, notes on the region selected for the analysis, an examination of the assumptions made (both in the type of analysis used and the specific application), and our conclusion.

Data Used

In determining the baseline statistics for the proposal, Stepwise Data Research primarily uses data from the Census Bureau's five-year American Community Survey (ACS). This choice is appropriate. The decennial census is only conducted every ten years, and at the time that the socio-economic analysis was conducted (2022), data from the 2020 Census were only available for certain statistics. The five-year ACS is essentially a rolling average of five years of sample data (in this case, 2016 to 2020). Therefore, while it may not be as up to date as the one-year survey, it is likely more accurate as it is based on a larger sample size. However, it should be noted that the ACS – even the five-year version – may have wide margins of error for sparsely populated areas.

Methodology

Appendices G and H of attachment 10-A to Wolfden's proposal describe the economic impact methodology and the multipliers used in the analysis. The report uses a methodology called an input-output analysis that is based on a model of the linkages between different industries and regions. This type of economic impact analysis is widely used and is an appropriate choice. However, the definitions of the terms used in the model should have been more explicit. In addition, the use of input-output analysis relies on several assumptions that should have been more fully explained, as the violation of these assumptions could have important consequences for the results of the model. Please see the Assumptions section below.

Definitions

Wolfden presents the results of its model in terms of regional output, earnings, and jobs; however, the report – both the summary and the full economic analysis - fails to adequately define its terms, leading to possible confusion or misinterpretation. Here we provide some definitions of terms used in the report that reflect best practices and would have increased clarity.

Output is defined by Stepwise Data Research as business sales (page 17 of Attachment 10-A). While that is technically accurate, a more complete term would be "gross output," which makes explicit that output is inclusive of intermediate inputs. A more commonly used measure when

ascertaining an industry's economic impact is “value added.”¹ For example, a business may have an output that looks impressive, but if it has high input costs, its value added may be slim. In addition, it would have been clearer to report that the "output" reported in the model includes earnings; that is, the two should not be added together.

Jobs: While the terms “jobs” may seem straightforward, the jobs presented in the results include both full-time and part-time jobs, not full-time equivalent or FTE. Although the jobs directly employed by Wolfden may be full time, the indirect or induced jobs supported by its economic activity may not be, especially in certain industries like construction or retail trade. This is briefly mentioned on page 62 in Appendix G, but in the interest of transparency it would have been better to include it in the presentation and discussion of results.

Indirect: The indirect economic activity supported by Wolfden is a result of supply chain linkages. For example, if Wolfden buys a piece of mining equipment from a local business, the increased demand for that business counts as part of indirect economic activity. We focus more on indirect activity later in the memo.

Induced: The induced effect is a result of Wolfden employees spending their money within the project area. While results are presented as total effects (i.e., direct plus a sum of indirect and induced), we define the term "induced" here for clarity.

Region Used

Item 3i of the Scoping Document requires an analysis of “how the project is likely to affect economic growth in the Houlton Labor Market Area, Penobscot County, and State.” The economic impact analysis located in attachment 10-A of the proposal uses Aroostook and Penobscot counties as the area of reference. Given the model that Stepwise Data Research used, the use of those counties as the reference area is justified, in our professional opinion. However, the narrative could note that the economic impact to the State as a whole may be underestimated, as there may be “leakages” to the State (outside the two reference counties) that are not included. (The Houlton Labor Market Area is not specifically identified in the analysis.)

Assumptions

There are two types of assumptions that should be clarified. The first are assumptions inherent in the input-output methodology utilized (common to all input-output analyses). The second are assumptions made by Wolfden/Stepwise Data Research in their analysis.

Assumptions of Input-Output Methodology

It is unfortunately far too prevalent for practitioners to rely on input-output analysis without explaining the underlying assumptions or the consequences of the violation of those assumptions. It is considered best practice to explain the assumptions and how they might apply

¹ Value added is the difference between gross output minus the cost of intermediate inputs.

or not apply to a particular situation. While Wolfden links to a page explaining input-output methodology in more detail, the underlying assumptions are not outlined. Hence, we list them here. Specifically, the assumptions underlying an input-output analysis are:

- Constant returns to scale: that a one percentage point increase in demand for a product will lead to a one percentage point increase in inputs required, no matter the level of production.
- Fixed input structure: that an industry uses the same method of production regardless of the scale of production.
- Industry homogeneity: that all firms within an industry use a similar production process to each other.
- No supply constraints: that there are no constraints on employment, raw materials, or other inputs.
- Static model: that the underlying relationships between inputs and outputs and regions remain constant over time. In other words, changes in prices, technology, consumer preferences, and government policy do not affect the relationship between inputs and outputs. Notably, the model does not allow for general equilibrium effects, such as might occur when an increase in demand in one sector causes a decrease in demand for another sector. Please note that by not allowing for general equilibrium effects, an input-output model will *always* project a positive economic impact. This limitation is often not well-understood.
- No backward linkages: that an industry's final output is not used as an input in another process.
- Immediate results: that the length of time it takes for an economy to regain equilibrium after an initial change is essentially zero.

The assumptions likely most relevant to the socio-economic analysis are: 1. the lack of supply constraints; and 2. the static nature of the model.

1. The assumption regarding the lack of supply constraints essentially assumes that a geographic area can support an increase in demand for an input (for example, labor). Wolfden explicitly assumes that all labor during certain phases of the project will come from the local labor market. Given the dearth of job opportunities in the area being studied, this may not be an inappropriate assumption. However, whether the necessary skills exist in the area or not is an open question, one which highlights the importance of Wolfden's proposed training program. If the training program is not successful, or if Wolfden cannot find adequate local labor to fill those positions, then labor must be imported from other areas. This will in turn result in a decrease in the direct local positive impacts that Wolfden predicts, and potentially an increase in relative factor prices in the region. We return to this assumption below.

2. Likewise, the assumption of a static model bears examination. A common error made by many users of input-output analysis is to present the results in terms of jobs or output "created", rather than in terms of jobs or output "supported." While the difference may seem semantic, it is an important distinction. An input-output model not only assumes no resource constraints (infinite labor and inputs available), but also that the jobs created are *net new* jobs (i.e., jobs that will be filled by previously unemployed individuals). This assumption precludes any "shifting" of jobs as current job holders respond to new opportunities. While switching from one job to another may indeed be a benefit to the individual, it is not a net increase of one job. The same caveat applies to the taxes and other economic activity claimed in the results. Therefore, it is more appropriate to say that the mining project "supports" a certain amount of economic activity, not creates it. To be clear, this is not a widely understood or well-advertised drawback of an input-output model, and Wolfden is by no means the only company to omit explaining the implications of this assumption.

Furthermore, the assumption of a static model implies that the results may only be valid if we assume no changes in technology, production processes, external demand, or factor prices over the fourteen years of the project. Despite common practice, it may be inappropriate to use input-output models for projects having a long timeline. The results therefore should be viewed with a healthy dose of skepticism, especially for an industry as volatile as the metallic mining industry. Best practice would be to at least acknowledge this uncertainty.

Assumptions Used in Analysis

- Wolfden assumes in its economic impact analysis that 100 percent of the labor in the operational phase will be from the local area. Notably, there is no clear justification of the percentage of jobs reasonably expected to be local, or a comparison of the skills needed in each job to a profile of the labor market in the area (as stated in item 3a in the pre-application Scoping Document). The proposal itself refers to a plan to hire workers within an hour travel distance of the Project (page 10.18), and that Wolfden's objective is to hire its primary workforce from the local economic region (page 10.19). The analysis conducted by Stepwise Data Research asserts that Wolfden "plans to hire 230 workers from the local economic region within about an hour from the site" (page 32 of attachment 10-A) but that "it is uncertain at this point in the planning process if the Project will be able to do so." Although we acknowledge the uncertainty inherent in the planning process, we believe that a clearer justification for the amount of local hiring proposed is necessary. As Wolfden itself acknowledges, "the primary constraint to hiring local employees will be the skills of workers in the labor market" (page 28 of Attachment 10-A). While we appreciate Wolfden's aspiration to hire 100% of its operations staff from the local area, a comparison of the skills needed in each job versus the skills available in the local area is necessary. It is worth noting that Wolfden does have an

ongoing plan to work with local colleges and vocational schools to address any existing skills gap, based on their programs elsewhere.

- The proposed wage ranges specified in table 18, which purport to show that the wages paid to on-site staff are substantially above the average wage in the economic regions, rely on a study “sourced by a third-party consultant hired by Wolfden” (footnote xviii). Without seeing the supporting document, we cannot verify these ranges, or determine whether they would likely apply to jobs created in the region being studied. Regardless, the fifth and sixth column of that table compare the wage range in each category to average wage in the LMAs and the economic region, respectively. A more accurate exercise would be to compare the wage range in each category to the corresponding wage in the same category in the study area. For example, while the wage range listed for supervisory staff is shown as 288% of the *overall* average wage in the LMAs, a more appropriate comparison might be to the *average supervisory* wage in the LMAs.
- In addition, note that Wolfden explicitly assumes that impacts on the local housing market will be minimal precisely *because* all labor will come from the local market. Such an assumption will not hold if labor needs to be imported from other areas.
- Finally, another important assumption is the percentage of inputs sourced from within the economic region. As stated on page 65, the local consumption percentage used to calculate the indirect and induced effects was supplied to Stepwise Data Research by Wolfden. There is no reason to suspect that those numbers are inaccurate. However, the local consumption percentage varies by "roughly 20 percent" (page 65). The upper bound of the local consumption percentage was used in calculating and presenting the indirect economic impact. There is no justification as to why the upper bound of local consumption, rather than the midpoint, was used to generate the presented estimate.

Discussion and Recommendations

We find that the socioeconomic analysis, conducted by Stepwise Data Research in Attachment 10 - A of Wolfden's petition, is largely complete and satisfies the basic requirements as delineated in Appendix A to this memo. The data, methodology, and region identified are appropriate. We do have several reservations about the assumptions made and the manner in which the results are presented. To summarize:

- **Local hiring.** While we applaud Wolfden's stated desire to hire one hundred percent of its operational workforce from the local area, we question the feasibility of achieving this goal. As stated, the area in which the proposed project is located does have a large percentage of unemployed, underemployed, and discouraged workers. Certainly the influx of well-paying opportunities will be welcome, if the current population can take

advantage of them. However, the bulk of the economic benefits claimed by the analysis hinges on whether their local hiring efforts are successful.

- **Jobs created versus jobs supported.** We would like to emphasize that the jobs claimed as created in the economic impact analysis are not necessarily net new jobs to the region; nor are they necessarily full time or permanent positions. The same applies to the other types of economic activity claimed by the model – the net impact of the proposed project may be smaller as economic activity is simply shifted from other sectors within the region.
- **Output versus value added.** The economic impact analysis presents its results in terms of output generated. In our professional opinion, presenting the results in terms of value added would be more appropriate.
- **Wages for newly created positions.** Without access to the document referred to in footnote xviii on page 65, we cannot verify the accuracy of the wage ranges or their applicability to the local area. We are concerned about the way in which the wages in the local area are compared to the wages of the newly created positions.
- **Relatively long timeline.** One of the assumptions underlying any input-output analysis is constant technology, production processes, factor prices, and policy. In a relatively volatile industry such as metallic mining, we urge caution in interpreting the results.
- **Local consumption percentage.** We question why the upper bound of the local consumption percentage, rather than the midpoint, was used when calculating the indirect and induced effects.
- **Impacts to the housing market.** Wolfden asserts that any impacts to the housing market will be minimal, as the majority of the labor will come from the local area. This assumption is tenuous at best.
- **Lack of a plan to monitor the impacts.** In our professional opinion, a socio-economic analysis should include a plan to monitor the impacts, and make adjustments to their recruitment, training, and hiring processes if necessary.

We agree with Wolfden’s assertion, on page 10.19 of their petition, that the project *as presented* would have a significant positive economic impact on a relatively depressed area. However, we are concerned that Wolfden’s socio-economic assessment presents the “best case scenario,” without paying due attention to uncertainties in the analysis. We commend Stepwise Data Research for acknowledging some of the caveats and limitations of the model by presenting the results within a range. We would go further and highlight the risks of not displaying the underlying assumptions prominently and of not presenting the sensitivity of the results to those assumptions.

Appendix A. Review of Information Requested in the LUPC’s Pre-Application Socioeconomic Scoping Document

1. Geographic Area (“Communities within and adjacent to the Commission’s jurisdiction”)				
	<i>Item</i>	<i>Application Location</i>	<i>Criteria</i>	<i>Status</i>
a.	Location of designated state service areas (determined by Municipal Planning Assistance Program)	Page 2	<p>The 2019-09-26 Scoping Document, page 2 notes:</p> <p><i>“The geographic area for regional socioeconomic analysis must include minor civil divisions within the LUPC service area as well as organized towns and plantations reasonably expected to be affected by the project. This geographic level of analysis is distinct from analyses at the county and state levels. The geographic area chosen for the analysis should be well supported in the petition.”</i></p> <p>This item is noted as information that will help determine the geographic area noted above.</p> <p>Regional service centers are regional economic hubs that will likely be impacted by economic development in the region</p>	<p><i>“The location of the Project’s nearest ‘regional service centers,’ as defined by the Maine Department of Agriculture, Conservation, and Forestry, which are Houlton in Aroostook County (40 miles away) and Millinocket in Penobscot County (50 miles away).”</i></p> <p>Identifies 2 of the states’ regional service centers, which are 40 and 50 miles away, respectively.</p> <p>Complete.</p>

b.	Location of designated LUPC rural hubs	Pages 10.14, 2, 18	See row 1a.	Patten is identified as the closest rural hub to the potential project. Complete.
c.	List of local economic development agencies with areas/regions served	This item is not addressed in the application.	See row 1a. This item is noted as information that will help determine the geographic area noted above.	Missing.
d.	Typical commuting distances in the area	Pages 42,43	See row 1a. Commuting distances provide information on multiple issues including infrastructure impacts, the geographic area an employer may draw from, and other economic impacts.	Complete.
e.	Federally determined opportunity zones in the area (if applicable)	Page 18	See row 1a.	Complete.
f.	Maps of State, county, and local transportation routes used during each phase of the project	Page 18	See row 1a. This information is also needed to assist with evaluating economic impacts to nearby communities.	Complete.

2. Baseline Statistics				
	<i>Item</i>	<i>Application Location</i>	<i>Criteria</i>	<i>Status</i>
a.	Primary industry and location of existing businesses within the regional labor market area	Pages 2-7 of 10-A, and section 10.16 and 10.19	<p>The 2019-09-26 Scoping Document, page 2 notes:</p> <p><i>“Significant social and economic baseline variables should include, but are not limited to, information on the following:</i></p> <ul style="list-style-type: none"> • <i>Existing Businesses (especially type and location)</i> • <i>Tourism and Recreation</i> • <i>Property Values</i> • <i>Employment</i> • <i>Human Demographics – population, density, age-structure, family structure</i> • <i>Regional public health”</i> <p>This request is part of establishing the baseline statistics as outlined in the scoping document.</p>	Complete.
b.	Data on existing tourism to the region, including any statistics on outdoor recreation (including type and location)	page 13 in 10-A and 10.16	See row 2a.	Complete.

c.	Housing statistics: Median and average rent, age of housing stock, occupancy rates, rent to income ratio (Houlton Labor Market Area). Include data on recent trends.	Median and average rent: p 14 of 10-A Age of housing stock: p 14 of 10-A Occupancy rates: p 14 of 10-A rent to income ratio: p 15 of 10-A data on recent trends	See row 2a.	Nearly complete. Data on recent trends is not given.
d.	Labor force characteristics: levels of training/education, labor force participation rate, number and percentage of seasonal versus year-round jobs, ethnicity, age breakdown (Houlton Labor Market Area). Include data on recent trends.	levels of training/education: page 6 of 10-A labor force participation rate: page 6 of 10-A number and percentage of seasonal versus year-round jobs: page 8 of 10-A ethnicity: page 5 of 10-A, although that is of the general population and not the labor force itself age breakdown: same as above Include data on recent trends.	See row 2a.	Nearly complete. Data on recent trends is not given.

e.	Sociodemographic variables: population, density, age-structure, family structure, number of persons per household, educational attainment, poverty rate, unemployment rate (Houlton Labor Market Area). Include data on recent trends.	<p>Page 3-5 in 10-A</p> <p>population: page 3 and 4 of 10-A</p> <p>density: page 3</p> <p>age-structure: page 4</p> <p>family structure: page 5</p> <p>number of persons per household: page 5</p> <p>educational attainment: page 6</p> <p>poverty rate: page 6</p> <p>unemployment rate</p> <p>Include data on recent trends: trends for population growth given, but not for other variables</p>	See row 2a.	Nearly complete. Data on recent trends is not given, except for population growth.
f.	Public health statistics: proportion of children living under the poverty level; number and percent of people without health insurance; rates of cancer and heart disease; obesity and smoking rates	<p>Available at county level 15-16 in 10-A</p> <p>proportion of children living under the poverty level: page 6</p>	See row 2a.	Nearly complete. Data on recent trends is not given.

	(Houlton Labor Market Area). Include data on recent trends.	<p>number and percent of people without health insurance: 10-15 and p 15</p> <p>rates of cancer and heart disease: age 16</p> <p>obesity and smoking rates (Houlton Labor Market Area): page 15</p> <p>Include data on recent trends</p>		
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3. Economic and social impacts of development:

	<i>Item</i>	<i>Application Location</i>	<i>Criteria</i>	<i>Status</i>
a.	Breakdown of the number, occupational title, and type of jobs expected to be created in each phase of the project, along with the median wage in each affected industry in the Houlton Labor Market; percentage of jobs reasonably expected to be local (along with clear justification for that expectation); comparison of skills needed in each job to profile of labor market in area	<p>Table 17 and 18 in 10-A, pp 21 and 22; also section 10-16 in application</p> <p>Breakdown of the number, occupational title, and type of jobs expected to be created in each phase of the project: pages 21 and 22</p>	<p>The 2019-09-26 Scoping Document, pages 2-3 note</p> <p><i>“Use the baseline information and data to inform analyses of the project impact. Analyses should go beyond narrative projections and should be based on rigorous analysis of data and comparisons with similar projects in similar areas to the extent reasonably possible.</i></p>	Partially Complete. Need clear justification on local hiring and comparison of skills needed in each job to profile of labor market in area.

		<p>median wage in each affected industry in the Houlton Labor Market: pages 21 and 22</p> <p>percentage of jobs reasonably expected to be local (along with clear justification for that expectation): missing clear justification</p>	<p><i>Analyses should include, but not be limited to:</i></p> <ul style="list-style-type: none"> - <i>Descriptions of the jobs created for phase of the project, including a breakdown of job types/quality with associated wages and benefits as well as the source of labor (migrant, local, non-local expert, etc.)</i> - <i>Descriptions of the materials used in each phase of the project and their sources</i> - <i>Analysis of the economic impacts of transportation during each phase of the project. Describe the route(s) for moving materials and the businesses located along each route. Describe the type and frequency of transportation used and the population living along the route. Provide information on impact to road maintenance from transportation associated with the project.</i> - <i>Describe any economic incentives that the project will use, whether local, state, or federal. Examples include tax credits, grants, opportunity zones, and tax increment financing (TIF).</i> - <i>Analyze potential economic impacts on local businesses and</i> 	
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			<p><i>tourism during each phase of the project</i></p> <ul style="list-style-type: none"> - <i>Analyze the effect of the project on property values</i> - <i>Analyze the effects of transportation on public health, safety, and welfare, including the effects of noise, pollution, and traffic type and frequency</i> - <i>Analyze the potential socioeconomic effects of any air, water, and soil pollution generated by all phases of the project, include socioeconomic effects on site (e.g., to health of workers) and in the broader region (e.g., public health)</i> - <i>Analyze in general terms the socioeconomic impacts of the project to the County and State”</i> 	
b.	Description of planned job training programs, including number and frequency, intended audience, as well as any transitional assistance for workers post-closure.	Section 10.17.	See row 3a.	Mostly complete, section 10.17. No description of post-closure transitional assistance: “Wolfden is committed to working with employees regarding financial planning and education in preparation for the Project’s eventual completion and reclamation.” page 10.17

c.	List of consumables needed in each phase of operation (categorized); what percentage of each item available from Maine sources; percentage of each item that is expected to be sourced locally	Appendix I, J, and K	See row 3a.	Complete.
d.	List of services needed in each phase of operation (categorized); what percentage of those services is available from Maine sources; percentage of each item that is expected to be sourced locally	Appendix I, J, and K	See row 3a.	Complete.
e.	Population and businesses along the routes used for moving materials	Page 79	See row 3a.	Complete.
f.	Description of any economic incentives that the project will use, whether local, state, or federal (examples include tax credits, grants, opportunity zones, and tax increment financing)	None.	See row 3a.	Already addressed.

	<p>g. Analysis of how project is likely to affect local businesses, tourism, and recreation during each phase of the project, including any assumptions made and a plan to monitor these impacts</p>	<p>Pages 30, 31</p>	<p>See row 3a.</p>	<p>No plan to monitor impacts.</p>
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h.	Analysis of how project is likely to affect housing prices in the Houlton Labor Market area during each phase of the project, including any assumptions made regarding number and type of transactions	10-18:	See row 3a.	<p>“If the Project is successful in its plan to hire local workers within an hour travel distance of the Project, the impact on the local housing market will likely be negligible”</p> <p>Complete.</p>
i.	Analysis of how the project is likely to affect economic growth in the Houlton Labor Market Area, Penobscot County, and State.	Page 26	See row 3a.	<p>The economic impact analysis was performed using Aroostook and Penobscot counties as the economic area. Economic impacts do not include impacts to the State outside of those areas. Economic impacts to the Houlton Labor market area are not specifically called out.</p>