Comment on Fifteen Mile Stream Gold Mine Project submitted by Atlantic Mining NS Inc

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Thank you for the opportunity to provide comment on the Environmental Impact Statement (EIS) of proposed Fifteen Mile Stream (FMS) Gold Project submitted by Atlantic Mining NS Inc, a wholly owned subsidiary of St Barbara Limited, as part of the Environmental Assessment (EA) process.

Before addressing specific items from the EIS, I first wish to express significant concerns with the project as a whole. In terms of the big picture, I question the wisdom of considering or approving a project that despite any or all mitigation measures will substantially degrade Nova Scotia's lands, waters and wildlife for the purpose of enriching a foreign multinational corporation and its stockholders. St Barbara Limited is an Australian based, ASX 200 company, which signifies that it is one of the 200 largest stocks (companies ranging in size from ~$380 million to over $100 billion) listed on Australia's primary stock market index. Gold is not a critically important mineral. Mining is temporary but the environmental degradation is forever. I urge Federal and Provincial decision-makers to reject this project proposal. Instead, encourage and support small, local community-based and value-added projects that are environmentally and socially sustainable in terms of biodiversity, climate and justice issues, thereby addressing, rather than exacerbating, these three inter-related, existential and life-threatening crises with which humanity and the earth is currently faced.

Second, I have significant concerns regarding the proponents' capabilities to carry out the proposed project in compliance with existing environmental regulations and any additional agreed standards of environmental protection that should arise through the EA process. Despite their reported efforts, Atlantic Mining NS Inc has had several non-compliance instances related to its gold mining operations in eastern Nova Scotia over the past few years, resulting in charges under NS's Environment Act: "failing to comply with the conditions of an approval" and "releasing substances into the environment in amount, concentration or level in excess of approval level or regulations" (Withers 2021). Most of the charges are related to the area of Mooseland and Moose River Gold Mines, where the company has an open pit gold mine, similar to the project subject to their current EA. The other alleged offence locations named in the charging information are Fifteen Mile Stream, Jed Lake and Seloam Brook, which include areas under consideration in this EA. The proponent's poor environmental record is matched by their poor regard for workers and health and safety conditions: "The Atlantic Gold workers decided to join a union in order to address *issues and concerns including health and safety, working conditions and unfulfilled promises regarding wages and promotions*" (emphasis added).

I urge Canada and the Province to reject the proposal. This should be justifiable on the basis of lack of confidence alone, but there are many other environmental reasons to reject the proposed project.

Beyond this specific project, I urge stricter protections, closer monitoring and stronger enforcement measures be applied to mining in general. I also urge changes to the Mining Act to limit its overarching power. I also urge stronger protections for biodiversity, such that it is prioritized over natural resource extraction and other environmentally damaging objectives.

In terms of specific comments, the EIS is confusingly laid out in terms of the relationship between the Tuoquoy Mine Site and FMS mine site. It appears that the FMS mine site is the primary subject of the EIS but many references are made to the Tuoquoy site, seemingly beyond its role as the processing site. It is difficult to comment on the relevant impacts when the scope of the assessment is unclear. The proponent should provide a revised EIS to clarify the relevance and purpose of including information on the Tuoquoy site within the EIS for the FMS mine site.

The EIS content is highly repetitive and hard to follow, making an informed assessment very difficult. Many sections refer to other sections and appendices and to separate documents that do not appear to be provided. Following the series of redirections to subsections and appendices leads to numerous rabbit holes. The proponent should provide a revised EIS to organize and present the relative information in a more coherent and less obfuscating way.

In relation to specific components of the EIS, I will concentrate my comments around concerns related to negative direct and indirect impacts on species and habitat, primarily terrestrial. Due to the repetitively sequential layout of the EIS and time constraints, my comments are similarly (dis)organized and repetitious, addressed as items were encountered in the report. My apologies.

It is stated within the document that "the application of a precautionary approach in developing this EIS will allow the EIS to act as a planning tool which will be used to ensure the Project avoids or mitigates potential environment effects and promotes sustainable development." Unfortunately, the EIS does not outline plans that adequately would "ensure the Project avoids or mitigates potential environment effects" on habitat and species. I do not see it as upholding a precautionary approach. Indeed, in its various evaluations it general understates the negative effects and risks and assumes overly optimistic mitigation outcomes from activities such as monitoring and reclamation, neither of which adequately address significant risks to species and ecosystems.

Existing and proposed mines are proliferating in this region along the Eastern Shore of Nova Scotia. The cumulative impacts of gold mines combined with other existing and proposed mining projects such as aggregate quarries are and will be significant for biodiversity in the region. Yet the proponent surprisingly claims there will be no or low cumulative effects on flora, fauna, habitat and significant wetland, stream and forest ecosystems.

This region is crucial to recovery of the endangered Mainland Moose. A new Mainland Moose Recovery Plan is on the verge of completion after decades of inadequate protections; its completion was mandated by the court after actions against the Provincial Government for failure to comply with its own NS Endangered Species Act (ESA). Revised recovery plans with delineated core habitat are nearing completion for all species at risk under the NS ESA, as mandated by the courts. Stronger wetland protections are currently being developed. A

Biodiversity Act has been newly legislated (April 2021), and at the same time, changes were made to the Crown Land Act to extend its mandate beyond forestry practices. These changes provide greater protections for biodiversity and are the direct result of wide-spread public support for such increased protection. These changes are being made in recognition of the increasing and immediate imperative to protect against further egregious and cumulative environmental degradations and impacts on wildlife and wildlife habitat, including aquatic, in Nova Scotia by projects like the proposed gold mine subject to this EIS. As such, these new and pending measures warrant acknowledgement and additional consideration in the context of this EIS, both by the proponent and by decision makers. In the context of these pending protections, I urge provincial and federal governmental decisions makers to reject the proposal. At a minimum, the EIS should be revised and reconsidered in accordance with these newly existing and pending policies.

Many cumulative impacts on wildlife (including at-risk and endangered species) and their habitat exist, and the proposed mine imposes even more. The FMS Mine Site will have a total disturbed area of approximately 400 ha, consisting of a massive (27-ha) open pit (~165 m depth); waste rock storage area; tailings management facility; low-grade ore stockpile; till and topsoil stockpiles; organic material stockpile; operational facilities (including 13 buildings); Seloam Brook Realignment; water management ponds and structures; potential borrow pit areas; 4-km access road; several major onsite mining roads; local road bypasses; engineered discharge to Anti Dam Flowage; sewage and waste pipelines and septic systems; powerlines; and lighting. This total disturbed area represents approximately 32% of the FMS Study Area, and 7% of the established LAA.

This footprint of nearly one-third of the site represents substantial loss and fragmentation of habitat and species populations, with cumulative reductions in forage, cover and movement pathways. In addition to the direct habitat losses due to the footprint of these infrastructural developments, many indirect impacts arise from opening-up the area to human and vehicular access, run off, and other 'edge' and fragmentation effects that negatively impact species. These larger-scale, cumulative, synergistic and associated indirect negative impacts on habitat and species are not adequately addressed in the EIS. Although it purports to do so, the assumptions, methods and size of the study area are insufficient to adequately address the impacts. The following comments, though not exhaustive, serve to provide some examples in support of this conclusion.

Significant habitats occur within and adjacent the Project Area, defined as the FMS Study Area and the Touquoy Mine Site. Additional detail is required to establish with confidence that the project will not negatively impact these areas and their associated values, cumulatively or in isolation. Obviously, where there is direct overlap or immediate adjacency between these significant habitats and the proposed developments and activities, there will be several severe direct and indirect impacts. Indirect impacts will occur through transboundary edge- and zone-of-influence effects.

- The entire Project Area is within a 'Mainland Moose Concentration Area', which is crucial to recovery of the endangered Mainland Moose under NS ESA. I will further address this issue in a subsequent section, but any overlap with Mainland Moose Concentration Area would impact moose and moose habitat, both of which are perilously

endangered and critical to recovery of the population, and thus should trigger rejection of the project.

- Other 'Areas with Species of concern' are immediately adjacent the Project Area. Edge-effects and other transboundary and landscape-scale patterns and processes and associated anticipated negative impacts on these areas should be detailed and avoided.
- Two 'Nature reserves' and 10 'Wilderness areas' exist within 10 kms, including the immediately adjacent Ship Harbour Long Lake Wilderness Area. Edge-effects and other transboundary and landscape-scale patterns and processes and associated anticipated negative impacts on these sites should be detailed and avoided.
- The Project Area is fully situated within the Liscomb Game Sanctuary. Although Game Sanctuaries do not restrict mining activities, the statute has long been criticized for this omission; arguably, mining activities have more intensive and longer-term direct and indirect negative impacts on wildlife and habitat than does hunting. Proposed direct and indirect impacts on 'game' species should be more carefully considered.

Wetland and aquatic habitat - The site contains significant freshwater aquatic systems of wetlands and watercourses with substantial habitat value for many species, including but not limited to fish. I am not a wetland or fish expert, but as a landscape-scale biodiversity expert it is clear that the project has the potential for considerable impact on associated species, functions and processes. The report highlights the potential 'benefits' to fish and fish habitat of proposed repairs to stream and riparian areas to correct damages from proponent's previous activities on the site. Though important, this does not sound like a 'net' benefit of the proposed mine and should be considered a requirement pending from previous damaging activities, given the source of the damage in the first place, rather than a 'benefit' of a proposed new mine. Further damages are also likely to occur in the process of addressing the original damage. Many other potentially negative impacts that would arise from new FMS mine construction, operations, and closure/reclamation activities are not adequately addressed.

Of additional concern, in rationalizing its previous failures to comply with environmental conditions, the proponent blamed rains and acknowledged their own challenges in mitigating against run-off after rains. On this and other sites where aquatic systems predominate, such challenges and failures are exceedingly likely, especially given current rain patterns and anticipated increases in storm intensities associate with climate change. The consequences of such failures are and would continue to be devastating for freshwater diversity, which warrants particular protection, as freshwater diversity is highly threatened. How will the proponent guard against similar future failures, such as failures to ensure that no run-off will occur after rain?

Flora (Section 6.9) - Priority flora species are recorded in the area. Through the site assessment for the EIS, the FMS area was determined to be a diverse site, consisting of 8 Ecosite types, within which 16 vegetation types were observed. Diversity of sites and vascular flora species are moderate to high, which is especially compelling given the relatively low fertility of soils in the area. Many (277) vascular plant species were identified, of which three are priority species. High integrity peatland ecosystems exist with high flora biodiversity, including peatland specialists of the Atlantic Coastal Plain Flora (ACPF) group. High integrity peatland ecosystems are increasingly rare, and the ACPF group of species on this site are unique, found nowhere in Canada except in Nova Scotia (MTRI, 2011). Many (59) lichen species were also observed,

including one Species at Risk (blue felt lichen) and eight other priority species (SOCI). Mature and old, intact natural stands and wetlands located on the site support several rare species of lichen. Mature conifer swamps of an intermixing of spruce and balsam fir surrounded by regenerating vegetation exist. These provide high quality habitat for many species. It is obvious that the site is highly biodiverse, containing several priority species in a mix of habitat types. Such diverse sites are crucial to maintaining healthy ecosystems systems and wildlife communities. A footprint of mining infrastructure directly affecting 32% of the FMS Study Area and indirectly affecting a much larger area would have substantial and significant impacts on ecosystems and species populations, including several priority species.

Interior forest habitat - Within the project area, the Touquoy Gold Project has already cleared substantial areas of coniferous forest, deciduous forest, mixed forest and wetlands. Approximately 250 hectares of habitat have been directly lost through construction of Touquoy Gold Project infrastructure. For FMS study area, many additional (and therefore cumulative) losses are proposed, projected as impacting 275 ha of interior forest habitat. This comprises 12% of predicted interior forest in the LAA, which is a significant amount of area. Interior forest habitat is an increasingly rare commodity within mainland Nova Scotia, where an increasingly dense matrix of roads exists, including forest roads, which serve to fragment forests into small patches. The region within which the project is proposed has among the largest remnant patches of intact forest in the province, and as such they are critical to supporting viable populations of species that rely upon interior forest. To lose 12% of predicted interior forest in the LAA within this important region for mainland moose and other species sensitive to human developments and activities is substantial in and of itself and contributes to cumulative losses of interior forest habitat more generally across the region and the Province. The impacts of these cumulative losses are not sufficiently acknowledged or assessed and are assumed to be low.

To determine potential Project impact on interior forest and Old Forest, the proponent has applied a 200-m buffer around Project infrastructure "to represent the extent of edge effect influence from its operational footprint" (6.9.5.2). This buffer was referred to as the area of "maximum project edge effect". Although this edge effect distance is used within the Old Forest Policy to define interior forest condition, it is insufficient and is intended to be revised in the revisions to the Old Forest Policy, which is currently in progress. Many studies show that edge and other effects extend much further, up to 17 kms from roads for large and sensitive mammals and 5 km for many bird species (Beazley et al. 2004; Robinson et al. 2010; Benítez-López et al. 2010; Torres et al. 2016). How was 200m determined to be maximum Project edge effect? Such low edge-, buffer- or influence- distances proliferated in early literature related to very localized and single-factor effects, such as dust or run-off, but are inadequate to buffer against larger-scale and multiple synergistic effects, such as noise, human access and associated activities, pest, disease and invasive and competitor species, piggy-back and spur road developments, etc. While buffer zones of 17 km may be considered economically and political unfeasible, they are ecologically relevant and they certainly show that a 200-m buffer is far from adequate, especially as conveyed as a 'maximum'.

The proponent appears to be applying two different standards to assess impact to forest interior habitat. For example, cutover forest areas are included in models that quantify interior forest; these quantities are then used to suggest that the proportion of interior forest remaining in the

regions is large, therefor interior forest losses through the FMS project are only 'fringe' amounts in the context of these larger areas. In another case, the fact that the forest areas are cutover is used to minimize the amount of impact to forest interior on the FMS site, as in the following.

> The two largest patches of potential interior forest are located in the east and southeastern portion of the LAA around Moser Lake and in the Toad Fish Wilderness Area. These patches contain contiguous forested habitat and could provide a means of wildlife movement, migration, breeding bird habitat and flora and fauna habitat. Maximum Project edge effect is predicted to impact predicted interior forest near the Seloam Brook Realignment, the eastern local traffic bypass road and TMF, and southern area of the plant and ancillary building footprint. Much of the area of predicted impact near the bypass road and TMF look to be cut over on aerial imagery …. It is expected that the results of this fragmentation on flora and habitat to be minimal (6.9.6.1).

These inconsistently applied assumptions are concerning. The site contains interior forest that supports wildlife species and their movement patterns, and this role should not be minimized in this case simply because some areas appear to be cutover. The negative impacts to habitat and flora from roads, TMF and plant and ancillary building footprints would be much more significant than those of forest cut-over areas. As acknowledged in other parts of the report, cut-over areas are temporary, and they are often still used by many species. In contrast, the FMS mine infrastructure would directly, dramatically and arguably irreparably impact these values. Accordingly, to conclude that the project will have minimal impacts simply because some of the infrastructural footprint overlaps with cut-over areas is inaccurate at best.

Mitigations options (6.9.7) for such impacts are unconvincing. They include the following.

- "Intact forest stands and wetlands will be avoided wherever practicable during detailed Project planning and design in favor of previously disturbed areas."
- "Where natural, intact habitat cannot be avoided, minimization of total Project footprint will be considered during detailed planning."

Who decides what is and is not 'practicable'? What are the criteria and parameters for deciding this? Who decides what can and cannot be avoided, and based on what parameters or criteria? Further, 'minimization of footprint is not the only consideration; location and alignment are crucial for minimizing impacts to specific SAR and to habitat connectivity. Questions of location and alignment in relation to larger wildlife corridors and movement patterns are not addressed in the EIS, and yet they should be. I return to this issue later in my comments, in association with materials submitted by the proponent in their Map Book.

Terrestrial fauna (6.10) - Targeted surveys were completed for bats, mainland moose, and wood turtles. Incidental observations were recorded for other faunal species. In their desktop evaluation, the proponent state that they "confirmed that the FMS Study Area does not contain wood turtle critical habitat". Critical habitat has not been adequately identified or delineated in NS for any SAR, and broad systematic surveys for their presence have not been conducted. Occurrence data are not exhaustive or complete. Specific to wood turtle, recent species distribution modelling is showing numerous sites with high potential for wood turtle occurrences that have not yet been surveyed and for which no occurrence data exists. It should also be acknowledged that the occurrence data that do exist, such as in the AC CDC, is solely 'presence'

data and does not contain ‘absence’ data. Specific to wood turtle, research findings show that a site needs to be surveyed for wood turtle presence an average of seven times before their absence may be confirmed. More survey effort for wood turtle is warranted on this site, especially given the substantial areas of streams and wetlands.

This same lack of evidence pertains to other species of concern, such as small mammals and fisher, and does not confirm absence of the species. For example, at the Tuoquoy Mine Site, no wood or snapping turtles were detected in the EARD process, yet in the intervening period one was seen in 2016 and nine were seen within a one-week period in June 2017. This illustrates problems in the EARD survey process (non-detection of snapping turtle) and may also indicate their disturbance by mining activities, causing them to be on the move, perhaps abandoning habitat.

FMS baseline - The desktop evaluation confirmed that the FMS Study Area is located within mainland moose concentration area and within the Liscomb Game Sanctuary. Mainland moose have been recorded within 12.7 km of the FMS Study Area; according to NSL&F regional biologist, 19 observations of moose have been recorded in the vicinity of the Liscomb Game Sanctuary since 2014. Observations curated by NSL&F include visual observations of cows, bulls and calves, as well as tracks, vocalizations and pellets, several of which were recorded within 2018 (pers. comm., Jolene Laverty, February 2019). Tracking surveys were completed by MEL for the purpose of determining the presence. Twenty-eight observations of mainland moose were documented within, and adjacent to the FMS Study Area through baseline environmental work completed in 2017, 2018 and 2019 (24 pellet piles and 4 track observations). Of the 28 observations, all but four were located within the current FMS Study Area (Figure 6.10-1) (6.10.3.1.1).

Many deer were seen on site (6.10.3.1.4). Deer pose a threat to moose, as hosts of the brain worm, p. tenuis, which causes death in moose. Further loss of forest cover and increased incursions of disturbed areas into intact forests as a result of FMS mine activities will create increased areas with conditions favourable for deer and less favourable for moose, to the detriment of moose. Such indirect impacts are not adequately considered.

Touquoy Mine Site baseline - Mainland moose tracks were observed within the Touquoy Mine Site during field surveys to support the Touquoy Gold Project EARD in 2006. Post-Construction Moose Monitoring Program monitoring and on-going surveys surrounding in 2017 and 2018 and throughout 2020 report only three moose sightings in 2017 and two in 2018. This may indicate a potential decline in moose presence as a consequence of mining activities at the site.

Defining study area boundaries (6.10.5) – In the field of spatial analyses, it is well known that the selection of the analytical unit affects the results. It is crucial, therefore, that the scale and resolution of analysis be relevant and appropriate to the question at hand. In this EIS, the LAA consists of a 500 m buffer on the Touquoy Mine Site and a 2 km buffer on the FMS Study Area (Figure 6.10-2). The LAA boundaries were defined by considering ‘the maximum expected extent of direct and indirect impacts to terrestrial fauna’. How were these ‘maximum expected extent of direct and indirect impacts to terrestrial fauna’ determined? The buffers (500 m and 2 km) are very small compared to zones of influence reported in the literature for multiple direct

and indirect effects for several sensitive species (e.g., 5-km for sensitive birds; 17 km for sensitive large mammals) (Benítez-López et al. 2010; Torres et al. 2016).

The EIS states that the RAA encompasses portions of ecodistricts that span an area broader than the expected Project impacts to fauna, and as such the RAA considers other project boundaries as per cumulative effects methodology. It is not clear what this means or how the RAA and the expected area of Project impacts to fauna was determined. At a minimum, this needs clarification so that its adequacy may be assessed.

The logic applied to assess the magnitude of a predicted change in terrestrial fauna seems flawed in that it is considered in relation to "loss of habitat for terrestrial fauna, above natural variation (considering ongoing anthropogenic disturbance regimes)" (6.10.5.2). By definition, 'natural' variation should not include 'anthropogenic disturbance regimes.' Natural and anthropogenic disturbances together result in cumulative disturbances, with cumulative losses to habitat and cumulative consequences for populations of species sensitive to the disturbances. Perhaps this is simply poorly stated, but it implies that a combination of natural and anthropogenic disturbances is used as a baseline for predicting change. Instead, all anthropogenic disturbances (existing and proposed) should be included on the 'loss' side in the cumulative effects assessment for fauna habitat.

Habitat Fragmentation (6.10.6.2) - Although the development of the mine infrastructure at the FMS Study Area will cause direct impacts to habitat used by terrestrial fauna, including upland forested habitat, the proponent does not anticipate it will result in changes in overall fauna populations. They justify this conclusion by indicating that the surrounding area is 'undeveloped, natural landscape with a diversity of habitats,' and thus it will accommodate or compensate for the loss. They also state that the habitat within the FMS Study Area is not unique or rare in the local, regional or provincial context. Both of these observations are problematic. The methodology described in Section 6.9.5.2 was used to simulate current conditions for interior forest at the RAA level as a proxy for habitat availability and fragmentation, and wildlife movement. Some of the problems with this methodology have already been addressed, such as assuming cutover areas provide interior habitat and the insufficient width of buffer or influence zones around the proposed FMS mine infrastructure. The evidence of such problems in the outputs include the presence of roads, harvested areas, other fields and human developments within the projected interior habitat (as evident in Figure 6.9-4 in the Map Book).

The proponents acknowledge that "Mainland moose are particularly susceptible to habitat fragmentation" but assume that 'Interior forest patches as simulated in the analysis are inherently good proxy for good areas of cover and protection as they are isolated from edge effects". This may be accurate if the interior forest patches were accurately simulated in the analysis and the edge effects were adequately buffered, which they were not. They also conclude that "large tracts of forest landscape undisturbed by roads still exist in this region" citing NSDNR (2015b). However, these statements are also based on narrow road buffers, and the road network has increased in the interim, especially forest roads. See figures 3-6 later in this report for evidence of the fragmented nature of forests, particularly mature forest, when ecologically relevant road buffers are applied, and especially when applied only to mature forest. Thus, the proponent's predicted total of 56,573 ha interior forest within the RAA is overestimated. The maximum

Project edge effect as discussed is highly underestimated. And, thus, the calculation that only 275 ha of interior forest will be affected and that this represents only 0.49% of predicted interior forest in the RAA is highly understated. These analyses should be redone for more accurate results.

As a consequence, the proponent's claims that 'much undisturbed, unfragmented habitat is present in the RAA', and that 'larger tracts are maintained around the FMS Mine Site' are overstated. (See figures 1-6 later in this report.) Accordingly, there will be more than 'some limited isolation of habitat,' particularly in the area between Seloam Lake and the TMF. The conclusion that 'accessible routes to provide movement through and across the larger region at the LAA and RAA level still exist for wildlife and are un-impacted by the development of the Project' is unsubstantiated and over simplified, and at best serves to push the responsibility onto other landowners.

The proponents further indicate that The Ecological Landscape Analysis undertake by NSL&F in 2015 and updated in 2019 identifies valley corridors travelling north and south between the Sheet Harbour area and the New Glasgow area, generally following the Highway 374 and passing around and through the FMS Study Area. One of these linear corridors follows the East River Sheet Harbour system (NSL&F 2019a). The Project has the potential to impact this corridor in particular between Fifteen Mile Stream and Seloam Lake, along Seloam Brook. Despite this, they indicate that the impact is predicted to be low because 1) they predict good connectivity elsewhere, to the north and south of the FMS Mine Site and 2) the Seloam Brook Realignment is planned to improve the habitat provided by this currently degraded and disrupted system. Yet they provide no maps to illustrate or support this claim.

The proponents suggest that "Direct mortality of fauna species could result from Project activities" (6.10.6.3). This is understated and based on a limited consideration that takes into account only the direct mortality factor associated with vehicular collisions on roads.

Sensory disturbance from project activities will likely cause a localized change in usage of the FMS Study Area by wildlife (6.10.6.4). Moose, for example, are sensitive to human activities and are likely to avoid the area and, if they do not, they will also be impacted by the increased presence of generalist species such as bear (which feed on moose calves) and deer (which carry p. tenuis). Sensory disturbance related to Project activity will occur within and adjacent the FMS Study Area and the Touquoy Mine Site, the latter of which is now proposed to have its life extended by seven years with additional material from the FMS mine. According to the results of the Noise Impact Assessment (Appendix J.1), noise measured at 45 dBA is predicted to travel not farther than 1.5 km from the FMS Mine Site property boundary and light propagation from has been determined to extend between 0 and 2km. Both of these disturbance distances are much wider than the 200m edge effect buffer mentioned earlier for impacts on old, interior forests and considerations of habitat connectivity. Terrestrial fauna within ranges of noise and light distribution surrounding the FMS Study Area have the potential to result in localized avoidance and other impacts extending well beyond the 200 m used as a buffer in analysing impacts to species and habitats.

Touquoy Mine Site - While the proponents state that "The Project will have no new effects on terrestrial fauna at the Touquoy Mine Site", they also indicate on-going disturbances and loss of habitat related to lighting, noise and deposition of tailings from the FMS concentrate in the exhausted Touquoy pit. They refer to a bird deterrent program that has been implemented to reduce avian interactions and prevent them from using the site as nesting habitat, and that is also can deter terrestrial species as well. They suggest that "a deterrent system should also be considered post closure at the Touquoy Mine Site when the pit fills as tailing deposition will be present", which may have "deleterious effects" on wildlife "resulting from long-term exposure". The indicate that the "addition of FMS concentrate for processing at the Touquoy facility will extend the life of the Touquoy Mine Site by seven years and incorporate the deposition of FMS concentrate tailings into the Touquoy exhausted pit thus extending the temporal indirect sensory disturbance to wildlife (as indicated above). Increased traffic poses a risk to wildlife within and between the FMS Study Area and the Touquoy Mine Site. These are significant longer-term impacts that are not adequately evaluated in terms of the severity of the effects.

There is no indication of where fill materials for FMS reclamation will be sourced to replace those moved from the FMS to the Touquoy site. There is a risk that such movements and removals of material will result in an on-going domino effect wherein proponents of open pit mines will argue for new mines as a way of reclaiming exhausted ones. This would further extend the periods of increased traffic on public roads and other risks associated with hauling materials across distances and extending the lifetimes of sites initially characterized as shorter.

Impacts of the Project on Fauna – Table 6.10-7 and associated text treat mortality only in terms of direct mortality. Instead, 'mortality' should be indicated as an 'impact type', and both direct and indirect mortality should be addressed at each project phase.

Mitigation (6.10.7) - Mitigation is addressed only for those instances where direct loss of habitat is expected to support development of the Project. What mitigation measures are proposed for other direct and indirect losses/impacts?
In terms of the proposed mitigation measures, questions also arise.

- 'Intact forest stands and wetlands will be avoided wherever practicable during detailed Project planning and design in favor of previously disturbed areas (e.g., stands disturbed by timber harvesting)'. – How is 'practicality' determined? By whom, and what are the criteria and processes?
- 'Where natural, intact habitat cannot be avoided, minimization of total Project footprint will be considered during planning'. – As with the previous, how is 'practicality' determined? By whom, and what are the criteria and process? And what is meant by 'minimization' and 'considered'?
- 'Site infrastructure will be fenced in, where practical and appropriate, to reduce interactions between Project infrastructure and wildlife'. – As with the previous, how is 'practical' and 'appropriate' determined? By whom, and what are the criteria and processes?
- 'A speed limit of 40 km/hr within the FMS Mine Site and Touquoy Mine Site will be implemented to reduce likelihood of collisions with fauna'. – Who will monitor and enforce this limit? What are the penalties for non-compliance?

- Appendix L.1 (AGC-PLN-ENV 002, page 34) states the company will reducing motor vehicle collision with moose "by limiting all mine vehicles to a 50km/hr speed limit within the Project." – Which is correct: 40 or 50?
- 'Full details of this program can be found in the Mainland Moose Management Plan'. – I see no such plan provided within the posted materials. What are the details of this plan? Where may it be found?
- 'An un-vegetated buffer along roadsides will be maintained, where practicable, to improve visibility along roadsides and reduce the potential for collisions with wildlife'. – How wide will this buffer be? Has the 200 m edge effect buffer been applied from the outer edge of this buffer? If not, it should be.
- 'Clearing and construction will be limited within wetlands that could support snapping turtles during winter hibernation period'. – What is meant by 'limited'? How is it determined and by whom? How will impacts to snapping turtle from such activities be mitigated outside of winter hibernation period?
- 'Site-specific measures to protect wildlife will be addressed in the WMMP which will be developed to support the EMS Framework Document (Appendix L.1)'. – This appendix provides little by way of detail or specific measures, at least not for moose.
- 'A wildlife deterrent system will be implemented at the FMS TMF, and continued at the Touquoy Mine Site and should be implemented to the open pits from both sites during post-closure, as is required'. – How have these been considered in the noise and other sensory impacts?
- 'Waste must be managed to reduce attractants to opportunistic wildlife species'. – How will waste be managed in this way? Who will monitor and enforce this? What are the penalties for non-compliance?
- 'Proper handling of hazardous wastes will reduce exposure to contaminants as a result of unplanned incidents'. –This is a vague statement and begs the question of confidence based on past poor history of compliance.
- 'Erosion and sediment control planning will be completed to ensure site runoff is not directed towards unaltered habitat'. – Presumably such measures were planned for at the proponents other sies, yet they were either not implemented or not effective and charges were laid. How will these plans differ or be ensured as being effective?
- 'For those species reliant on wetland habitat, a wetland alteration application will be submitted during Project planning and designed to request an authorization to alter wetland habitat. Loss of function and habitat will be addressed in this wetland alteration application, along with associated proposed compensation'. – How are we to assess and comment upon impacts and mitigation outcomes with respect to such undefined future plans?
- 'Mainland moose monitoring program is to be implemented to determine moose activity surrounding the active FMS Mine Site'. Monitoring the decline of moose is an insufficient mitigation for loss of moose habitat and connectivity and impacts on moose individuals and local groups. – How will loss of moose habitat and connectivity and detrimental direct and indirect impacts on moose individuals and local groups be avoided or minimized?
- 'In order to protect adjacent habitats from accidental spills, ensure that spill control and contingency planning is in effect, and its procedures fully communicated to staff'. – As with above, presumably such measures were planned for at the proponent's other sites,

and yet they were either not implemented or not effective and charges were subsequently laid. How will these plans differ or be assured to be effective?

The proponent concludes that 'a significant adverse environmental effect for fauna has not been predicted for the Project for the following reasons':

- During Construction, 'direct impacts to fauna habitat are expected, however, impacts will be minimized through on-going Project design and micro-sighting of infrastructure footprints wherever practicable'. This claim is not substantiated by the many adverse effects noted throughout the document. For example, how will direct mortality and displacement of individuals, local groups and local habitat be "minimized" for all of the many and diverse species at risk, species of concern and significant wetlands that are found within the footprint and buffer areas of the infrastructure footprints to be avoided/safeguarded?
- 'The baseline habitat of the FMS Mine Site is a network of existing fragmentation due to historical and present forestry activities'. As acknowledged in the proponent's report, these forestry activities are 'temporary': trees can grow back. This is a completely different situation than a massive hole in the ground, massive stockpiles of materials, some of which are toxic, on-going machinery and other noise and lighting disturbances.
- 'Construction work will be considerate of the breeding patterns for fauna, wherever practicable'. Who determine 'practicality' and how? And how will this help mitigate the situation for these species in the next breeding period?
- 'Construction noise and light will be limited to a 12-month window'. This window is to long, spanning breeding and other important seasonal requisites for wildlife.
- During Operations 'noise will be elevated above baseline during this period and may cause disturbance of fauna in close proximity to the Mine Sites'. Nosie is not the only impact during operations. Many other operational structures and processes will have significant adverse effects on fauna.
- During Closure, 'noise will be elevated above baseline during reclamation activities (2-3 years) involving mobile equipment and then drop to baseline for the post-closure period'. As with operations, many other structures and processes will have significant adverse effects on fauna during this period.
- 'Appropriate mitigation such as wildlife deterrents will be implemented to deter wildlife species from entering the TMF and open pits during post closure'. The deterrents themselves, if effective, will also impact fauna, presumably for the indefinite future. And who will maintain and monitor these over this extended indefinite period?

Avifauna (6.11) - Although there are significant effects and concerns associated with avifauna impacts, as a solitary citizen do this in my so-called 'spare' after work time, I do not have time or energy to address them here. Hopefully there are others (avifaunal experts) who will comment on these concerns and deficiencies.

Species of Conservation Interest and Species at Risk (6.12) - Numerous priority species within all taxa considered were identified as having an elevated potential to be located within the FMS Study Area. Although fewer numbers were actually observed, this is not surprising, as surveys were not extensive, and in previous surveys, such as indicated for the Touquoy mine site, several species present on the site were not observed within the baseline surveys but were observed on

site and nearby during construction and operation. Although I have concerns with many impacts upon various Species of Conservation Interest and Species at Risk, I will limit my comments to moose.

Mainland Moose (6.12.3.3.1.1) - The mainland moose (Alces alces americana) is listed as endangered under NSESA and considered S1, or critically imperiled. Of highest concern are threats related to disease and parasites, poaching, access to moose habitat, and development. Scotia. The proponent has indicated that "as such, 'core habitat' has not been defined or designated under the Endangered Species Act." While it is true that delineation of core habitat remains in progress and is imminent, it is not the case that it has not been designated for the reasons implied.

The FMS Study Area lies within a significant Mainland Moose Concentration Area, as identified in Endangered Mainland Moose Special Management Practices (NSDNR 2012b). Within the FMS Study Area, suitable habitat for moose at varying times of the year are present. Historical mining and timber harvesting have resulted in clearings, and subsequently, regenerative wood perennials which provide suitable foraging for moose in the winter months. Open waterbodies are also present which support aquatic vegetation which are often common foraging grounds for Mainland Moose in the summer months. In portions of the FMS Study Area, mature conifer stands also exist, which provide refuge for Mainland Moose. The forest industry is required to protect viable moose shelter patches when harvesting on Crown land. Through direct consultation with NSL&F to confirm current locations of these shelter patches, there are nine moose shelter patches that have been identified to the Proponent within the FMS Study Area. The Proponent has endeavored to avoid these patches during mine development planning; however, site infrastructure will impact three of these shelter patches. Twenty-eight observations of mainland moose were documented within, and adjacent to the FMS Study Area through baseline environmental work completed in 2017, 2018, and 2019. Of the 28 observations, all but four were located within the FMS Study Area. Although mainland moose sign observations were spread throughout the FMS Study Area, there were several moose observations (n=6) concentrated within and/or directly adjacent to WL125. This wetland is located within the proposed footprint of the WRSA. These data all confirm the high importance of the area for the critically endangered Mainland moose.

Although it is noted that Mainland moose tracks were observed within the Touquoy Mine during field surveys to support the Touquoy Gold Project EARD in 2006, there is no indication of how many or how extensive the survey methods were. Since 2017, Post-Construction Moose Monitoring at that site has revealed three sightings in 2017 and two in 2018. In comparison, the number of moose at FMS mine site are strikingly higher. Indeed, they appear to be higher than recent NS L&F surveys conducted in areas thought to contain the highest densities of localized groups of moose. Accordingly, the numbers observed confirm that the site and region is crucially important to Mainland moose and represents a key concentration area.

Thresholds for Determination of Significance (6.12.5.2) - As in 6.10.5.2 the logic applied to assess the magnitude of a predicted change seems flawed in that it is considered in relation to "loss of habitat, within or above natural variation (considering ongoing anthropogenic disturbance regimes)". By definition, 'natural' variation does not include anthropogenic

disturbance regimes. Natural disturbances and anthropogenic disturbance together result in cumulative disturbances, with cumulative losses to habitat and cumulative consequences for occurrences and populations of moose. Further, in terms of disturbance, a 400-ha industrial site that includes a 27-ha, 165-m-deep open pit and other significant hazards and extended zones of effects beyond the site is of a different order of magnitude of change than forest harvesting, particularly as far as moose are concerned.

Priority Terrestrial Fauna (6.12.6.3) - The proponent makes the misleading statement that "Mainland moose are not particularly affected by habitat fragmentation based on habitat preference; however, increased access into a site (construction of new roads) may increase direct interaction with the species, including potential accidents. As such, low-level habitat fragmentation can indirectly affect mainland moose." The later part of the statement is accurate. However, the first part is misleading. Although moose are not particularly affected by habitat fragmentation based on 'habitat preference', they are significantly affected by fragmentation caused by substantial changes (such as large surface mines) that are well beyond the realm of what could be considered 'habitat.' As acknowledged, moose can utilize various ages of forest and other natural cover, so long as there is sufficient forage and cover within reach. In the case of the proposed project, the open pit, WRSA, other stockpile areas, building, roads, lights and noise will all convert and fragment habitat in dramatic ways. These types of conversion represent direct loss and fragmentation well beyond 'habitat preference'.

The report notes that,

> "Development of the FMS Mine Site will cause direct impacts to habitat used by mainland moose. The WRSA is expected to directly impact WL125 where six observations of moose sign were documented.... Upland habitat where moose signs have been observed are also expected to be directly impacted by the TMF and WRSA…. Project activities are expected to result in increased habitat fragmentation and a decrease in habitat quality for those species"

These impacts are unacceptable and should trigger at rejection of the proposed project on their own.

The proponent goes on to suggest these direct losses are not significant, indicating that "broadly speaking, accessible routes to provide movement through and across the larger region at the LAA and RAA level still exist for wildlife, including moose, and are un-impacted by the development of the Project." The problem with this rationale is that it externalizes the responsibility for moose habitat, pushing it off onto other landowners, private and public, and assumes that these areas will remain as noose habitat in perpetuity. When looking at the bigger picture, the area is very fragmented by roads and the remaining areas that are not are critically important for moose and should stay that way. The site of the FMS is situated in an area at the junction of remaining corridors of highest quality moose habitat and low road density on Crown Lands. Its loss is significant at the regional context of moose habitat and at the scale of the population level for moose. It is highly likely that the area, particularly the portion on Crown land, would be within core moose habitat, once designated.

Even though the "FMS infrastructure footprint is situated primarily on an area of high

existing disturbance and will only have fringe effects on the interior forest availability", there are three problems: 1) key parts of the FMS infrastructure are on key areas of good moose habitat and not on disturbed habitat; 2) there is a huge difference for moose in terms of ability to use and travel through existing disturbed areas (e.g., clear cuts) in contrast to proposed FMS mining infrastructure (165-m deep, 27-ha open pit; buildings, stockpiles, etc.); and, 3) the so-called 'fringe effects on the interior forest availability' are significant in terms of their location at a key connectivity pinch point, as noted above. See map image (figure 1).

The proponent draws heavily on the literature, including a published study by a graduate student under my supervision, and which I co-authored (Snaith, Beazley, MacKinnon and Duinker 2002). There are several inaccurate interpretations of the work, such as the example noted above. There are problems with the way the 'interior forest' assessment was conducted, and with the results as interpreted. The area of analyses even at the RAA scale is too small in terms of assessing the area requirements for moose habitat, especially for considering the cumulative impacts of such losses on the minimum critical area to support recovery and viable meta-populations of moose over time. The zones of influence to be buffered around roads and other human development, constructions and activities are too narrow.

Lots of species at risk on the FMS site, with 28 observations of signs of Mainland moose, good moose habitat, wintering areas and significant wetlands. Most are within the mine infrastructure footprint, including a 27-ha open pit that will be 165-m deep, buildings, stockpiles, roads, lighting, etc. that cover 400 ha, plus their zone of influence on wildlife. And proponents claim there is no significant impact because there is plenty of space for all of the species at risk, including moose, beyond the site, in the larger region. This is not the case across spatial scales that are relevant for moose.
Further, the so called 'fringe' level of impact from the proposed activities on moose and moose habitat are occurring at a critical juncture, where there is a pinch point in moose corridor connectivity between moose concentration areas (see images).
Core moose habitat and associated recovery measures (along with those for other species at risk in NS) are not yet designated or implemented. So, we all need to speak out for their protection, as there are few other mechanisms that will do so.

Priority Terrestrial Fauna Species (6.12.7.3) – The proponents state that 'Mainland moose was the only priority terrestrial fauna species observed within the FMS Study Area. Standard mitigation measures outlined previously in Section 6.10.7 will provide appropriate guidance and these mitigation measures outlined below will be also be considered specifically for priority fauna' (moose):

- 'Implement the WMMP as presented in the EMS Framework Document (Appendix L.1), which outlines specific measure to monitor impacts of the Project on moose, including activities such as repeated winter track surveys and pellet group inventories, and collaboration with the Mi'kmaq of Nova Scotia to study Mainland Moose in a broader context'. - Unfortunately, these measures serve solely to monitor and track impacts, they do nothing to avoid or mitigate the impacts on moose. It is unclear what will happen if impacts are observed.

Appendix L.1 (Fifteen Mile Stream Gold Project Environmental Management System (EMS)

Framework Document) provides very few details and indicates "Full details of this program can be found in the Mainland Moose Management Plan". I see no such plan provided within the posted materials. - What are the details of this plan? Where may it be found? Is this an existing provincial government plan, or is it something prepared or to be prepared by the proponent?

In the table on p. 700, direct loss of wetlands and upland habitat suitable for Mainland Moose within a Mainland Moose Concentration Area is noted. Adverse effects are listed as 'increased access into a site (construction of new roads) may increase poaching levels; lowered viability of individual populations of moose by direct mortality and reduction in range; and habitat alteration, fragmentation, or loss.' No mitigation measures are noted for these habitat losses and degradations, or for lowered viability of moose population associated with these direct and indirect mortality factors. Noted 'Associated plans' list only Recovery Plan for Mainland Moose in Nova Scotia (NSDNR, 2007), with no mention of action plan or special management practices in Moose concentration areas. There is no acknowledgement of pending revisions to the Recovery and Action Plan with identified core habitat as mandated by the court and required by the NS ESA, which should be in place within the near future and certainly prior to initiation of the construction phase. If the project receives approval to move forward, it should only be on the condition that he provisions of the pending, updated Recovery plan be adhered to once approved.

It is stunning that after all the direct and indirect mortality factors and adverse impacts detailed for valued ecosystem components, significant wetlands and stream complexes, species at risk and of concern, and others, the proponent concludes that there are no significant residual environmental impacts for terrestrial fauna and avifauna (Table 6.12-17).

Impacts on Mi'kmaq of Nova Scotia - The duty to consult with the Mi'kmaq of Nova Scotia remains with the Crown. The federal and provincial governments should not rely upon the results of the Proponent's Mi'kmaq of Nova Scotia engagement program and EIS development in the EA decision-making process. Given the proponent's previous egregious behaviour in public consultation processes, I have little confidence in the proponent's processes and likelihood of proceeding in good faith.

The proponent states that "the Project has the potential to impact the Mi'kmaq's ability to access lands during the temporal life of the Project; and, to potentially alter the presence or availability of animals or plants that the Mi'kmaq rely on." Consistent with the Treaties of Peace and Friendship, through which the Mi'kmaq did not cede any lands, and other Constitutionally protected Aboriginal rights, upheld by the Supreme Court, no approval should be given by the Crown without the express approval of the Mi'kmaw Nation, consistent with a nation-to-nation relationship.

The Beaver Lake and Sheet Harbour reserves are the two Millbrook communities in closest geographic proximity to the proposed Project. Millbrook First Nation is currently not represented in consultation by the ANSMC. - How were or will they be consulted? What are their concerns?

The proponent indicates,

> Analysis of Project effects on the Mi'kmaq of Nova Scotia is limited; however, a more general analysis of Project impacts is completed which allows for appropriate

> conclusions relating to residual impact and significance of effects. On-going engagement and dialogue during the EIS review process will continue to refine the specific conclusions and proposed mitigation and management commitments relating to the impact of this Project on the Mi'kmaq of Nova Scotia throughout the life of the environmental assessment process.

How and by who will these vague processes be conducted, monitored, enforced, incorporated, responded to, etc.? what if the specific conclusions change to indicate impacts that are not able to be mitigated?

Again, despite the lack of information and noted impacts, the proponent concludes there are no significant Residual Effects of the Project on Mi'kmaq of Nova Scotia (Table 6.13-8). This is at best a premature conclusion. Who has made this determination? The significance of effects should be determined by the Mi'kmaq. Was this the case?

Overall, I have not reviewed the remaining sections closely, but it is my observation that in general the risks are highly under rated. Conclusions of low, no and minor risks and effects are prevalent, despite many impacts being indicated throughout. The proponent's conclusions warrant close scrutiny.

For example, in Table 8.5-6: Residual Cumulative Environmental Effects for SOCI and SAR, the proponents conclude the Low Adverse Effect (Not Significant). They suggest that "the small proportion of regional habitat that supports priority species that would be lost as a result of this Project will be restored during the reclamation stage of Closure Phase". It is highly improbable that this will be possible. How do the proponents plan to ensure their restorations of SAR and SOCI are successful? These species are at risk for a reason: they do not grow readily in most conditions. How does the proponent plan to recreate such specific conditions, and where will the genetic material to do so be obtained?

Further, they indicate that "there is limited additional development pressure from projects in the RAA." Even if current pressures are 'limited", which is a relative and non-subjective evaluation, 1) even 'limited' pressures are significant given the increasingly limited amount of remaining intact forest and wetland habitats that support such species (see figures 4-6 near the end of this report), and 2) development pressures could increase dramatically tomorrow. Indeed, it is highly likely this proponent themselves will soon be back with another mining proposal, in a continuous domino-like process of digging a huge open pit and using the spoils to fill/ the previous open pit. What are the proponents plans for filling the proposed hole, since much of the spoil from this hole seems to be targeted for filling the Touquoy pit?

Comments related to information provided in the Map book - Most of the site is on Crown land (Fig 2.1-1; 6.13-4). This proposed project does not represent sustainable stewardship of Crown land and is inconsistent with the intentions of the Biodiversity Act and the Province's commitment to implement the recommendations of the Lahey report, which calls for the primacy of ecosystem and biodiversity objectives on forested Crown lands, including a big-picture strategy and spatial planning for achieving it.

In terms of valued components noted and spatial overlaps with proposed infrastructural footprint, there are several key concerns that the proposed mitigations do not adequately compensate or ensure good outcomes.

- The FMS and Tuoquoy sites are adjacent and near three protected Wilderness Areas (WA) (Touquoy site against Ship Harbour Long Lake WA and FMS against Boggy Lake WA and Toadfish Lakes WA) (2.1-4). Transboundary impacts are likely.
- At both sites, there are numerous field delineated wetlands and watercourses throughout, connected to and immediately adjacent the footprints of pits, stockpiles, roads, tailings management area, waste rock storage (6.6-6; 6.6-8) including many with WESP Transcribed (6.7-1).
- Many species at risk are noted as present within wetlands of special significance on the stie, including moose, blue felt lichen, and several bird species (6.7-2).
- Many/most of these wetlands are subject to direct alteration (6.7-3) and direct and indirect impacts (6.7-4), including to fish (6.8-5).
- Modeled areas of interior forest in LAA and RAA are highly over predicted. Figure 6.9-4 clearly shows extensive areas of roads, harvested areas, other fields and human developments.
- Figure 6.7-2 clearly shows 20 locations for moose within the FMS study area and another immediately adjacent, the majority of which overlap with the infrastructure layout footprint.
- The majority of moose scat and track observations are within the FMS study area (22 out of 25 observed in the broader region surveyed) with most (18) of these directly within the mine infrastructure layout footprint (6.10-1).
- The site is covered in occurrences of priority avifauna species of conservation interest (6.11-6).
- Numerous avifaunal, fish, lichen, mammal and vascular plant species at risk or of conservation concern exist within the FMS infrastructure footprint (6.12-1).

The area of regional assessment is insufficient for considering cumulative impact assessment of various human land uses changes on Mainland Moose. The RAA is described as delineated by 'Considering the Habitat and Flora Regional Assessment Area, Terrestrial Fauna and Avifauna Regional Assessment Area, Aquatic Regional Assessment Area and Projects Evaluated in the Cumulative Effects Assessment. Though not quite clear what this means, the RAAs are delineated in figure (8.5-5) are too small in spatial scope for considering impacts on the moose population, or more accurately, meta-population, and its recovery (See figures 1-6 later in this report).

This region is among the best very little remaining intact moose habitat and one of the few areas of remnant localized groups of moose. Moose are sensitivity to human developments and activities; they have large ranges and habitat area requirements. The recovery of moose is likely needed to be primarily addressed on Crown land given inadequate provisions for protection on private lands. Multiple activities are noted as occurring on Crown land across the eastern NS region (figures 8.5-6 and 8.5-7a-d) that are also detrimental to moose and moose recovery efforts at a scale that is relevant to moose and their population viability. The EIS does not adequately consider these larger scale impacts to this critically endangered species.

I have deep concerns related to cumulative fragmentation effects of the spatial distribution of this and other mines and developments on Crown lands in terms of connectivity for wildlife. A good portion of the mine site is Crown land. Given recent push back from private landowners, many biodiversity and other conservation objectives are likely to have to be met on Crown lands, and current PAs are not sufficient to do this on their own. Changes to the Crown lands act are in part a way of achieving that, such as through implementing a triad approach to forestry, the biodiversity act and endangered species recovery planning.

Attached are a couple of coarse map images (Figures 1 and 2), where I have overlaid publicly available information (NSDNR 2012; Beazley et al. 2005) onto one of the proponent's submitted figures. The FMS site is within an area that represents very narrow/limited opportunity for moose corridor in areas of low road density and high moose HSI in the area. The images show the unfortunate location of the site within the eastern moose concentration area and at a crucial pinch point between east-west and north south corridors for moose on Crown land. Together, the site and the lake to the north of it will cut off connectivity for moose (and other species) on Crown land at this important junction.

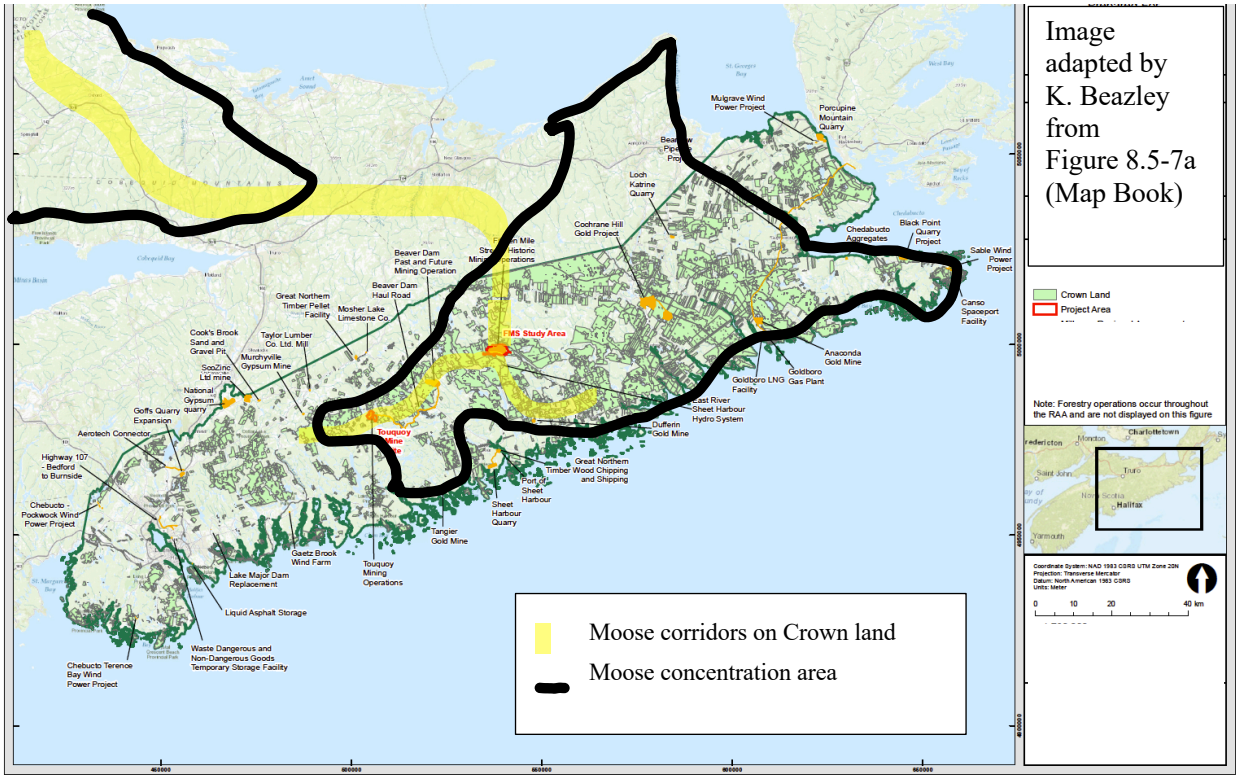

Figure 1: Moose concentration areas (NSDNR 2012) and corridors (Snaith et al. 2002; Beazley et al. 2005). This image shows the unfortunate location of the proposed FMS mine site at a critical junction for moose corridor habitat on Crown land. Figure 2 shows an expanded image that also shows how loss of moose habitat in the FMS mine site combined with lakes to the north and northeast of the site would effectively cut off connectivity for moose in this corridor.

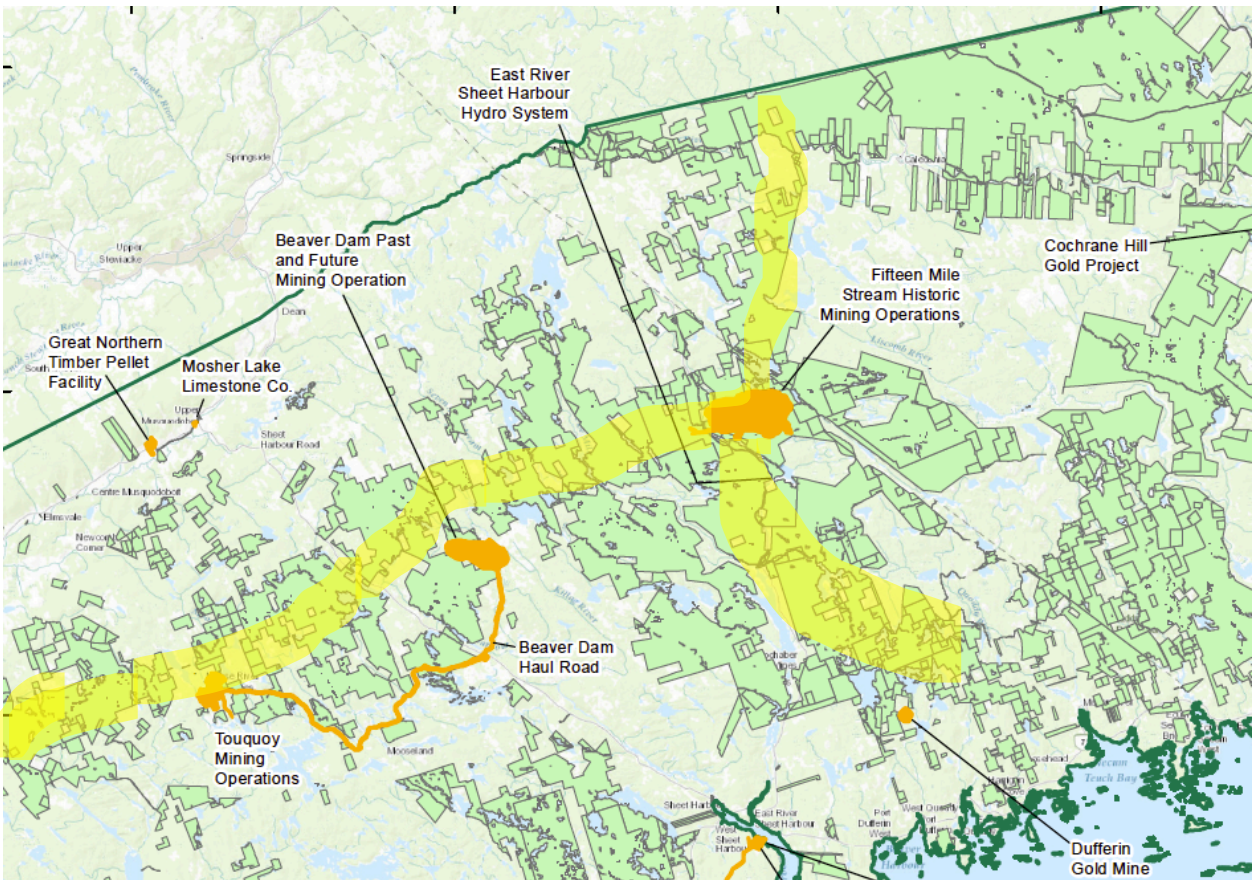

Figure 2: Expanded image from Figure 1, showing pattern of Crown land relative to moose corridor (yellow highlight), proposed FMS mine site (orange) and adjacent lakes to the north and north east of the proposed FMS mine site. Together, if developed the FMS mine site and lakes would effectively cut off connectivity for moose on Crown land.

To me it seems the proposed FMS gold mine represents a direct threat to moose. The proponent's figures show 20 moose locations within the FMS study area and another immediately adjacent, the majority of which directly overlap with the footprint of the infrastructure layout (open pit, buildings, etc.; Map book figure 6.7-2). The majority (22 of 25) of moose sign (scat and tracks) observed during surveys in the broader region occur within the FMS study area, with most (18) of these directly within the footprint of the mine infrastructure layout (Map book figure 6.10-1).

Alone and together with other mines in the area, the proposed development represents a high cumulative threat to moose, and to biodiversity and connectivity in general.

Beyond moose, there are many other species at risk or of concern, including blue felt lichen, vascular plants and avifauna. There are also tremendous impacts to wetlands. These all occur both within the direct footprint of the infrastructure layout and in the surrounding areas of influence/edge.

As a citizen with biodiversity conservation expertise, I am pleased to have the opportunity to comment on the EIS. I really hope that government departments with responsibility for land and wildlife (biodiversity) such as NS L&F, NS ECC and ECCC push back hard on the EIS. Significant impacts pertain to species at risk, other species of concern, wetland complexes, freshwater and forested ecosystems, wildlife habitat and Wilderness Areas. Especially on Provincial Crown lands, more area is need for protected and conserved areas as part of the conservation leg of an ecological land management triad, contributions to national goals for connectivity and 25% by 2025 (in line with federal funding opportunities), and commitments to Indigenous protected and conserved areas. Approving unsustainable projects such as the proposed FMS Gold Mines foreclose options for these other, arguably much more important initiatives to address biodiversity, climate and humanitarian crises.

Ultimately someone needs to change the Mining Act, such that it doesn't have so much power over everything.

Other supporting figures

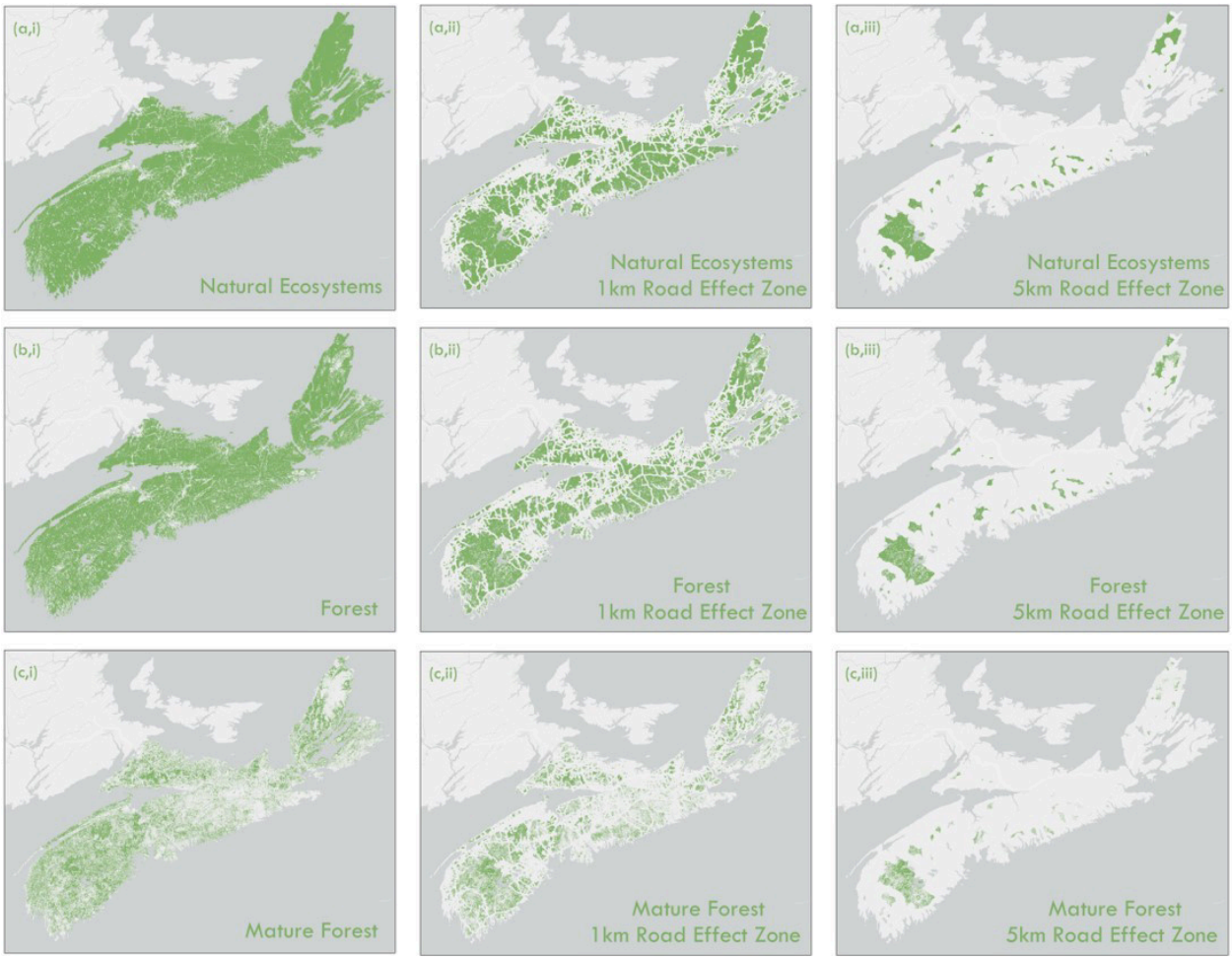

Figure 3. This figure shows the scarcity of intact natural, forest and mature forest in the region and across the province when road effect zones are taken into account. Different classifications of forest on which the analysis was conducted in the study region. Natural ecosystems are defined as all forested, wetland and barren classifications in the Nova Scotia forest inventory (a), forest consists of all treed classifications in the Nova Scotia forest inventory (b) and mature forest are those forested stands with a minimum age of 40 years (proxied as a minimum stand height of 12m) (c). Analyses were conducted on each forest classification without taking into account the road effect zone (i), using a 1km road effect zone (ii) and using a 5km road effect zone (iii). Nova Scotia forest inventory data is from the Nova Scotia Department of Lands and Forestry; Nova Scotia Roads database is from GeoNova; base map is from ESRI. Image from Cunningham et al. (2020).

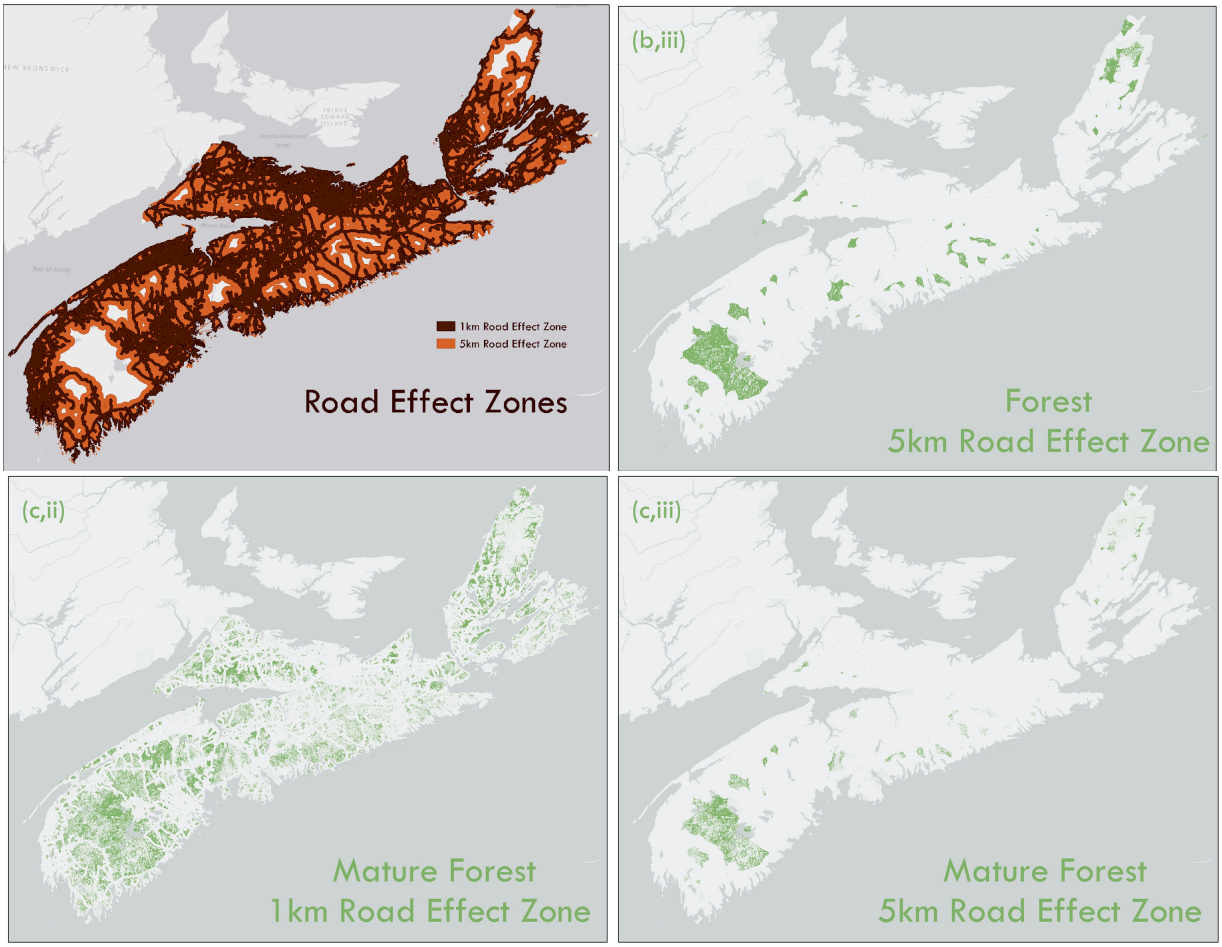

Figure 4. The 1 and 5 km road effect zones across Nova Scotia. Across the province, the mean distance to road across the entire province was 1.8 km and the maximum distance was 25.6 km. Images show the fragmented nature of forest sin NS, especially so-called mature forest (40 years and older), and especially when considered at ecologically relevant road effect zones (e.g. 1 km Minimum; 5 km or more for large and sensitive species such as moose).

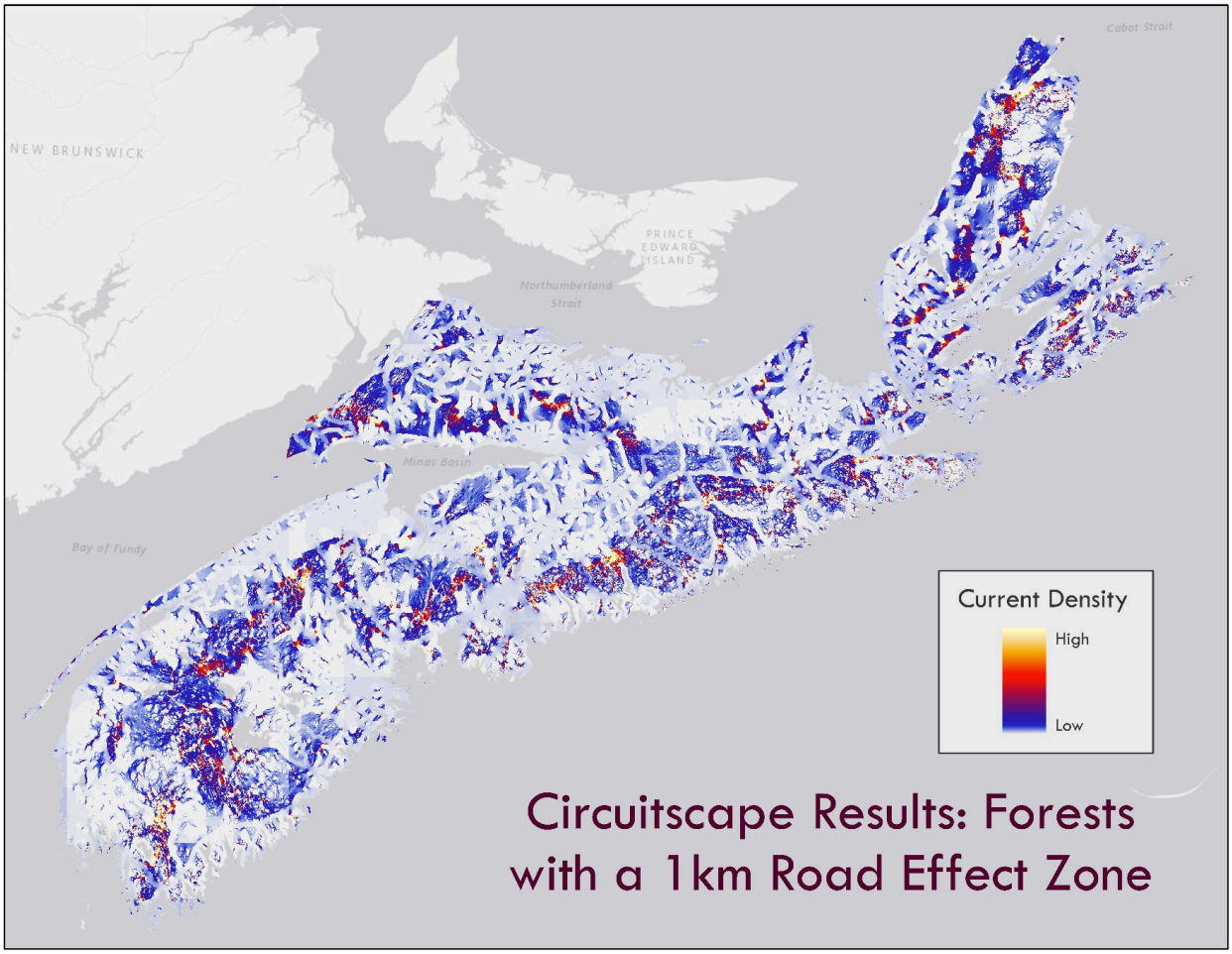

Figure 5 Results for the Circuitscape analysis for forests with a 1 km road effect zone across the province. This image shows the fragmentation of forest connectivity, which impacts connectivity among habitat and the ability of remnant localized groups of species such as moose to function as a viable meta-population. The region in which the FMS and Tuoquoy sites (and other mining sites) are situated is crucially important to moose habitat, connectivity and recovery. Image from Cunningham et al. (2020).

References

Beazley, K., T. Snaith, F. MacKinnon, and D. Colville. 2004. Road density and potential impacts on wildlife species such as American moose in mainland Nova Scotia. Proceedings of the Nova Scotian Institute of Science 42(2): 339-357

Beazley, K., L. Smandych, T. Snaith, P. Austin-Smith, Jr., and P. Duinker. 2005. Biodiversity considerations in conservation system planning: a map-based approach for Nova Scotia, Canada. Ecological Applications 15(6): 2192-2208. doi.org/10.1890/03-5270

Benítez-López, A., Alkemade, R., & Verweij, P. A. (2010). The impacts of roads and other infrastructure on mammal and bird populations: A meta-analysis. Biological Conservation, 143(6), 1307–1316. https://doi.org/10.1016/j.biocon.2010.02.009

Cunningham, C., K.F Beazley, P. Bush, J. Brazner. 2020. Forest Connectivity in Nova Scotia. Research report. Nova Scotia Lands and Forestry: Halifax, Canada. 2020; 87 pp. Available: https://novascotia.ca/natr/forestry/programs/LandscapePlanning/Sept2020_ForestConnectivity.pdf

NSDNR. 2012. Endangered Mainland Moose Special Management Practices. Endangered Mainland Moose Significant Population Concentration Areas. Available: https://novascotia.ca/natr/wildlife/habitats/terrestrial/pdf/SMP_Mainland_Moose.pdf

Robinson, C., P. Duinker and K. Beazley. 2010. A conceptual framework for understanding, assessing and mitigating ecological effects of forest roads. Environmental Reviews 18: 61-86

Snaith, T.V. and K.F. Beazley. 2002. The distribution, status and habitat associations of moose in mainland Nova Scotia. Proceedings Nova Scotian Institute of Science 42(2): 263-317

Snaith, T.V. and K.F. Beazley. 2002. Application of population viability theory to moose in mainland Nova Scotia. Alces 38: 193-204.

Snaith, T.V., K.F. Beazley, F. MacKinnon, and P.N. Duinker. 2002. Preliminary habitat suitability analysis for moose in mainland Nova Scotia, Canada. Alces 38: 73-88

Torresa, A, Jaegerb, JAG, and JC Alonsoa. 2016. Assessing large-scale wildlife responses to human infrastructure development. Proc. National Acad. Science, 113 (30): 8472–8477. doi/10.1073/pnas.1522488113