Executive Summary

On February 20, 2019, the US Army Corps of Engineers released the draft environmental impact statement (DEIS) for the Pebble Project, a proposed copper-gold-molybdenum mine in the headwaters of the Bristol Bay watershed. The DEIS describes the potentially affected environment, the proposed project and its alternatives, and makes an effort to evaluate the environmental effects of those alternatives. While the DEIS does evaluate a number of impacts of the mine during normal operations, it does not consider the potential environmental impacts of a tailings dam failure like the ones that have recently occurred in British Columbia (Mt Polley, 2014) and Brazil (Samarco and Brumadinho, 2015 and 2019). In justifying this decision, USACE notes that “Massive, catastrophic releases that were deemed extremely unlikely were…ruled out for analysis in the EIS.”

Many of the aspects of the proposed tailings facility at Pebble suggest that such a failure is not “extremely unlikely”: the bulk tailings facility is approximately an order of magnitude larger than the facilities that failed at Mt. Polley and Samarco; the dam that must hold these tailings back, in perpetuity, is approximately 164 meters high, and it uses a design that USACE itself notes is less stable than other available designs; the more than 1.3 meters of precipitation that falls at the site each year suggests that the tailings are very likely to remain wet and unstable after mine operations cease; and there are very real risks of seismicity at the site that could destabilize the facility via dam failure or liquefaction. Furthermore, PLP has hired Knight Piesold – the same engineering company who designed the failed Mt. Polley tailings facility – to design the tailings dam using a nearly identical design to the one that failed there.

Given these clear risk factors, we believe that the public cannot make an informed decision on the proposed Pebble Mine without an understanding of what the impacts of a TSF failure might be. As the lead federal agency and the project proponent, respectively, this responsibility should ultimately fall on USACE and PLP. However, in an effort to provide the public with relevant information during the DEIS public comment period, Lynker undertook a modeling study to estimate the downstream impacts of a TSF failure, if it were to occur. We used publicly available data describing the physiography and hydrology of the region, and data published by PLP describing the proposed TSF design and other mine site characteristics, to build a model of tailings release and downstream transport. We developed our model using the FLO-2D software package, one of the few flood modeling packages capable of simulating the non-Newtonian flows that characterize tailings failures, and one that is commonly utilized by the mining industry for similar purposes (e.g., Knight Piesold, 2014; TetraTech, 2015). We used a comprehensive sensitivity analysis to evaluate how outcomes vary with different model parameters, and developed a set of failure scenarios to bracket the range of potential downstream impacts for different release volumes and durations. We believe that our results provide regulators and the public with information that will be valuable during the public comment period for the DEIS.

Under all of the scenarios tested, our model results indicate that the tailings from a dam breach would travel more than 75 kilometers (~50 miles) downstream, beyond the confluence with the Mulchatna River, where the majority of our simulations end. Over the entire modeled reach, the mudflow fills the valley bottoms, spreading tailings across the off-channel habitat in the floodplains. The tailings within this limited model domain alone would be deposited in approximately 250 kilometers of streams that are mapped as salmon habitat (Johnson and Blossom, 2018), and approximately 700 kilometers of streams that have been identified as potentially suitable for salmon spawning and/or rearing (Woll et al., 2012). In these simulations, up to ~80% of tailings are still moving through the downstream boundary of the model.

In the limited number of simulations where we expanded our model domain, the results indicate that the mudflow under most scenarios would continue beyond the confluence with the Nushagak River, more than 130 kilometers (~80 miles) downstream. In these simulations, approximately 50% of the tailings are still moving through the downstream boundary of this model. Given the fine-grained nature of the

material, it is extremely likely that these tailings would continue to Bristol Bay, where they would eventually settle out in the Nushagak River estuary. While we do not simulate the long-term fate of these tailings after the initial flood wave passes, the extent of this deposition suggests that clean-up would be nearly impossible, and that natural attenuation would likely take decades. A summary report describing the complete results of our analysis, including model setup, sensitivity analysis and a comparison of outcomes from different scenarios, is currently being finalized.

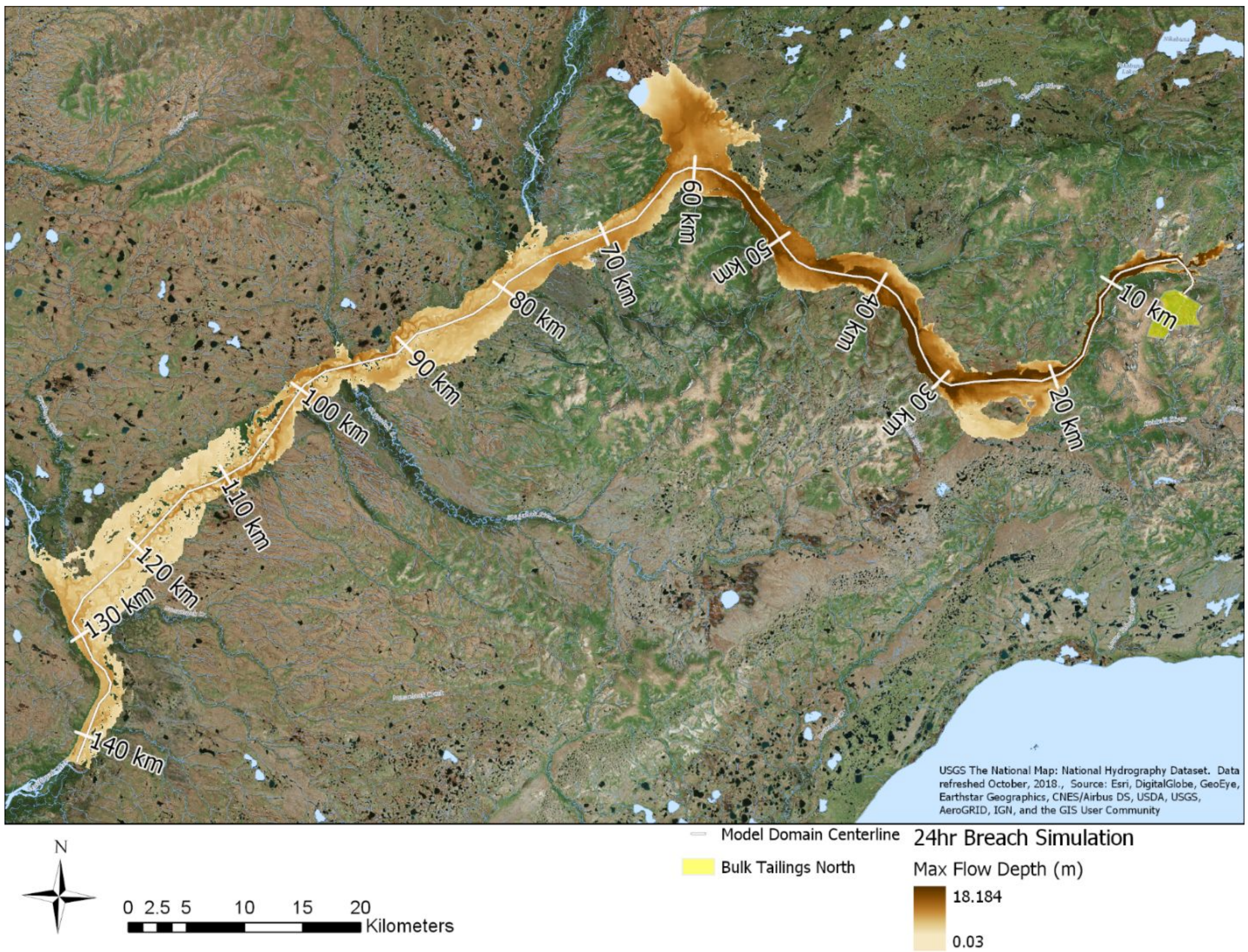

Figure 1. Example output from a 24-hour breach releasing 41% of the tailings from the proposed Bulk Tailings Facility. Released volume calculated from Rico et al. (2008)

References

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