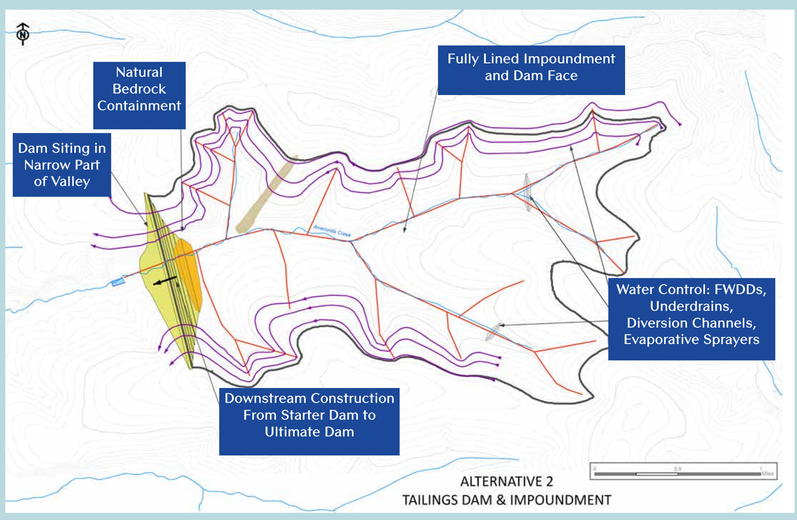
Donlin Gold Project DEIS
Tailings Dam

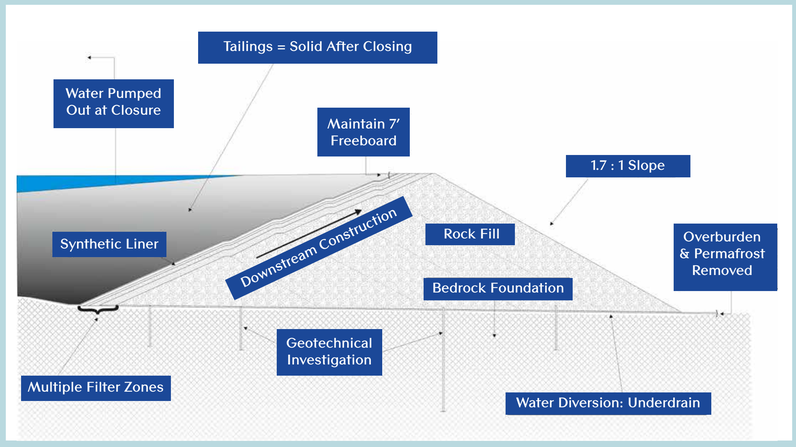
The proposed mine under Alternative 2 (Proposed Action) and Alternatives 3A, 3B, 4, and 6A would require a large dam to contain tailings and process water. Under the dry stack alternative (Alternative 5A), three dams would be required to contain process water in a large operating pond and separate the water from the tailings. The Draft EIS provides in-depth analysis of the dam design, potential effects of geohazards on dam stability, the likelihood or risk of dam failure, and addresses questions brought forward by local residents. Some key questions and findings are summarized here.

How would the Tailings Dam under Alternative 2 (Proposed Action) be constructed?

- Main dam of Tailings Storage Facility (TSF) would be built in narrowest part of Anaconda Creek Valley, a tributary to Crooked Creek.
- Dam and impoundment would be fully lined, covering 2,351 acres, with capacity for 330,000 acre-ft (568 million tons) of tailings.
- Dam would be constructed in phases, beginning with starter dam and building in a downstream direction. Height of dam at completion = 464 feet.

Elements in Blue Boxes are Design Features that Reduce Risk and Promote Dam Stability





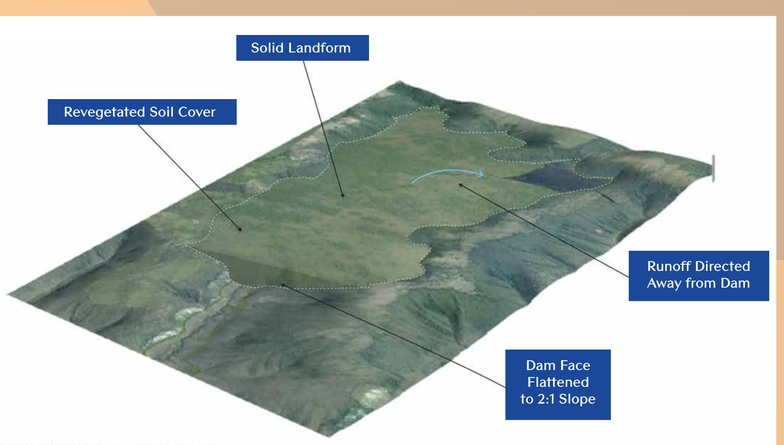
Note: This topic poster is designed to give a general overview. More information on the tailings dam can be found in the Draft EIS, Sections 3.3 – Geohazards, 3.5 – Surface Water Hydrology, and 3.24 – Spill Risk.

Is the dam safe? What dam features promote dam stability and reduce risk?

Dam safety is typically approached by 1) evaluating the probability that various geotechnical and hydrologic hazards would occur, 2) conducting investigations and modelling studies to quantify those hazards, 3) designing the dam and operations to mitigate risk, and 4) following a systematic program of inspections and monitoring throughout all phases of the mine life.

Key design features to reduce risk include:

- Building a strong dam. The dam footprint would be excavated to bedrock, removing overburden and permafrost; then the dam would be constructed using compacted rockfill on a prepared underlayer. This provides geotechnical stability.
- Lining the entire facility. This reduces the risk of contaminating groundwater.
- Reducing water behind the dam. The dam would have multiple filter zones, water drainage control features to divert and move water away from the dam, and a water treatment plant to treat and discharge water. Maximum pond volume = 9,000 acre-ft in year 20.



TAILINGS DAM AFTER CLOSURE

What would happen to the dam in closure?

The tailings facility would be drained; there would not be a water cover after closure.

- The TSF water would be pumped to the pit.
- Tailings would consolidate as water drains out.
- The dam would be regraded to a lower angle.

To reclaim the TSF, the surface would be capped with a layered soil cover and sloped to direct water away from tailings. Surface reclamation would take 3 years, and tailings consolidation about 50 years. End result: solid stable landform. Dam stability and seepage/underdrain flow would be monitored on a regular basis in post-closure. A reclamation bond and trust fund would pay for TSF closure costs and post-closure monitoring and water treatment.

What would happen to the dam in an earthquake?

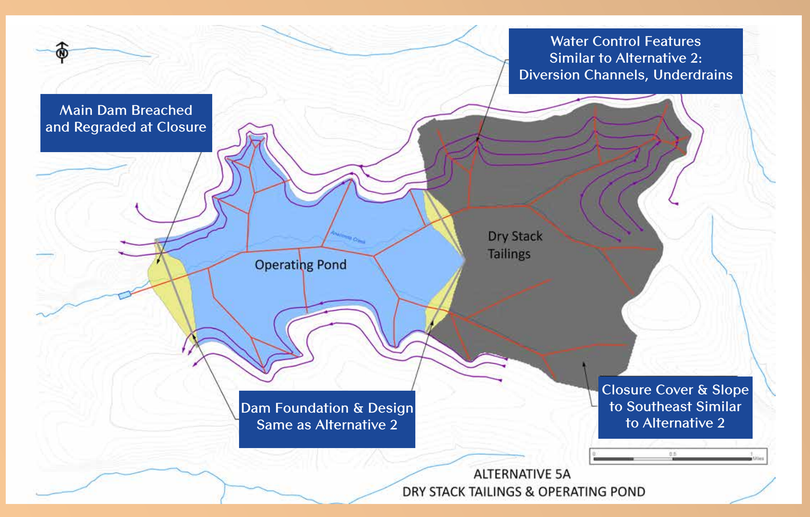
Project-specific seismic studies, as well as dam performance examples worldwide, indicate that the dam would be extremely unlikely to fail during the largest earthquake considered possible in the mine region, and would remain functional and easily repairable. Modelling predicts that damage from a major earthquake would be in the form of structural deformation concentrated at the dam crest: a Magnitude 7.8 earthquake would cause a maximum of 1-4 ft vertical settlement and 1-16 ft lateral movement of the crest in downstream direction, which would not result in loss of containment.

Under Alternative 5A (Dry Stack with Operating Pond), how would the TSF dams be constructed?

No dam would be required to hold the tailings, but dams would be in place to separate the dry tailings stacks from the operating pond, which is needed for the processing plant. The pond is created from water squeezed out of the tailings before they are stacked.

- There would be 3 operating pond dams: the main lower dam as well as 2 upper dams that keep water from entering the dry stack. The operating pond would contain process water which gets pumped back to the process plant for reuse.
- Combined operating pond and dry stack footprint = 2,463 acres.
- Main operating dam maximum height = 367 feet. Maximum upper dam height = 218 ft. All three dams and the operating pond would be fully lined.
- Dry stack = 412 feet high; total volume = 239,500 acre-ft (590 million tons). Maximum operating pond volume = 125,300 acre-ft in year 27.
- Many aspects of the Alternative 5A dams would be the same or very similar to Alternative 2: Anaconda valley location, dam foundation and design, water management features, closure cover and runoff to southeast, post-closure monitoring, and financial assurance.
- At closure, operating pond water would be pumped to the pit, and the main dam breached and graded back into the footprint. Reclamation would take 5 years.

Under both Alternatives 2 and 5A, the tailings would be "dry" in post-closure, with solids and vegetation on top, and would require a pit lake.



Dam safety is regulated by the State of Alaska Department of Natural Resources (ADNR). Approval is required to construct, operate, alter, repair, remove, or abandon a dam. ADNR guidelines contain design requirements for hydraulics and geotechnical hazards, and require that a Failure Modes and Effects Analysis (FMEA) be conducted late in the design phase to evaluate potential failure causes and provide a process for improving potential design issues prior to construction. ADNR also has financial assurance requirements associated with dam safety, reclamation, and post-closure monitoring and maintenance. ADNR considers the TSF dam to be Hazard Class I, which means there would be a probable loss of one or more lives if failure were to occur. ADNR requires an Emergency Action Plan that contains a dam failure analysis and inundation maps estimating the extent of downstream flooding in the event of a breach.

The potential impact of a dam failure is described on the Spill Risk poster, and found in the Draft EIS, Section 3.24 – Spill Risk.

Village of Crooked Creek
Native Village of Napaimute
Native Village of Chuathbaluk

Native Village of Aniak
Knik Tribe
Akiak Native Community

Photos: Dave Cannon