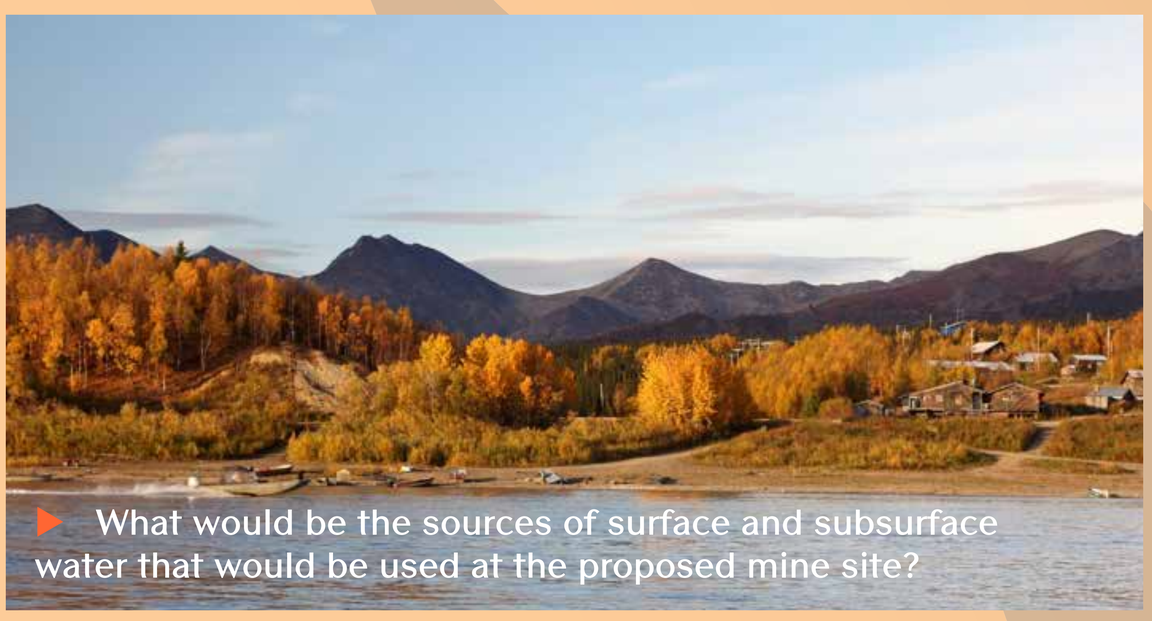
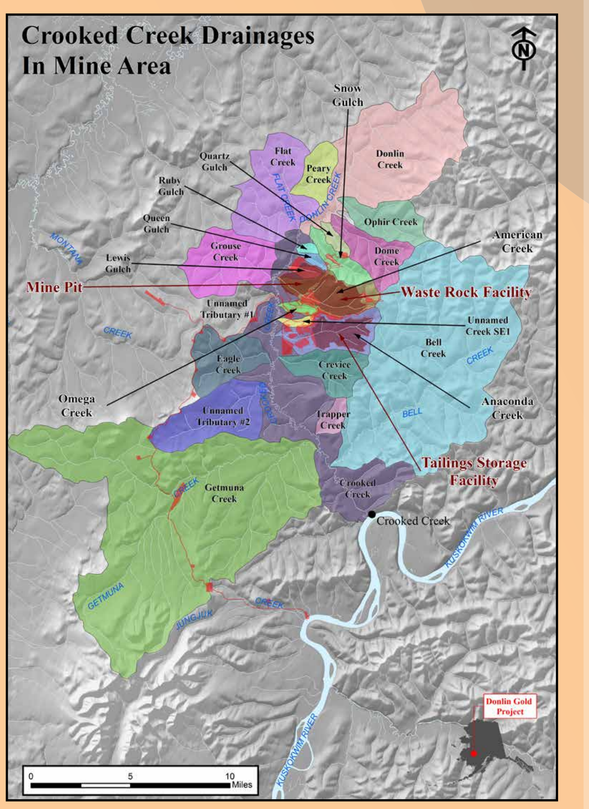
Donlin Gold Project DEIS
Water Flow

The proposed mine would use a great deal of water, especially in the milling process. While much of the water used in milling would be recycled from the tailings pond or other project sources,, some water would come from surface water sources, and some from pumping groundwater that would naturally seep into the mine's open pit. The Draft EIS provides in-depth analysis of potential effects, and addresses questions brought forward by local residents. Some key questions and findings are summarized here.



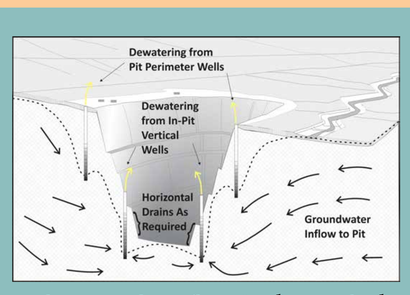
What would be the sources of surface and subsurface water that would be used at the proposed mine site?

The proposed Donlin Gold mine site would use an average of 17,700 gallons of water per minute over the life of the mine. The majority (79 percent) would come from reclaimed water from the tailings pond, while 12 percent would come from contact water ponds (for example, water that has drained from the waste rock). Smaller amounts would come from pumping groundwater that would naturally seep into the mine's open pit, and the Snow Gulch freshwater reservoir. The majority of the proposed mine pit and waste rock facility would be located in the American Creek watershed, and the Tailings Storage Facility would be located within the Anaconda Creek watershed, both tributaries to Crooked Creek. Other mine-related development such as roads, overburden stockpiles, freshwater reservoirs and ponds would occur in smaller tributary catchments including Crevice Creek, Omega Gulch, Lewis Gulch, Queen Gulch, and Snow Gulch.



Initially, excess water used at the mine would be treated before it is discharged back into the Crooked Creek drainage.

Cone of depression **-** To allow the mine pit to be safely excavated, groundwater must be pumped to lower the groundwater to levels below the pit flow. This creates a hydrologic low, called a cone of depression, into which groundwater drains. This causes a reduction in the water table, and may reduce flow in the creeks hydraulically connected to the water table. The cone of depression for the proposed project would, at its greatest, reduce flows across a 2- to 3-mile stretch around the mine site.



How would the proposed mine's water use change water flow in the area?

The proposed mine site would be located within the Crooked Creek drainage, a tributary of the Kuskokwim River near the village of Crooked Creek. It would reduce the volume of water that flows into Crooked Creek. Seventeen drainages feed Crooked Creek in the proposed mine site area. Water flow from about 10 miles of these tributary stream drainages, representing about 8 percent of the catchment for Crooked Creek, would be lost due to damming, pit dewatering, and other diversions. After closure, shallow groundwater beneath the Waste Rock Facility would continue to flow into the pit lake. Once the pit construction begins, some water from Crooked Creek may flow to the pit. Crooked Creek could continue to lose flow from groundwater flowing to the pit lake. As part of the water balance planning, the mathematical model selected for analyzing water supply and use for the mine was tested against baseline data, yielding results well within accepted industry standards.

After use at the proposed mine, where would the water go?

The water being used in processing would be temporarily stored in various dam or pond structures at the mine site. Initially, excess water that would be used at the mine would be treated at the water treatment plant to meet Alaska Water Quality Standards (AWQS) before it is discharged back into the Crooked Creek drainage. After the mine closes, water would fill the mine pit, resulting in a permanent pond or pit lake. Approximately 50 – 55 years after mine closure, the pit lake would approach the design water level, and excess water would be treated to meet AWQS and discharged indefinitely.

How would the proposed mine affect water flow in Crooked Creek?

Effects on Crooked Creek flow could vary widely depending on season, precipitation, bedrock conditions, mine phase, and distance from the mine. In winter, the effects of pit dewatering on Crooked Creek from the proposed mine would be largest when streamflow is most supported by groundwater as baseflow. With subsurface water being diverted to the pit dewatering system through stream leakage and groundwater flow, reductions in winter flow in the middle reaches of Crooked Creek adjacent to the mine are predicted to range from 20 to 100 percent, depending on bedrock and precipitation conditions. Much of the winter flow reduction would be restored below Crevice Creek.

Summer flows in Crooked Creek are predicted to be reduced by a maximum of 9 percent, and the reduction in annual average flow is predicted to be a maximum of 20 percent. During the years leading up to the last years of operations, pit dewatering would be discontinued but flow reductions would persist for multiple years gradually decreasing , as pit water levels recover during and after closure.

What would be the long term pattern of water flow in the mine site area after closure, and what would be the ongoing environmental effects?

During the closure, reclamation, and monitoring phase, stream flow within the mine site would continue to be affected due to diversion and storage of surface water. After completion of mining operations, the pit dewatering system would be turned off. Recharge to groundwater would cause the cone of depression to slowly recover. The pit would begin receiving water from groundwater inflow, surface water flow from the American Creek watershed above the pit, and from water transferred from the Tailings Storage Facility. Captured runoff, seepage, and groundwater within the American Creek and Anaconda Creek watersheds not suitable for discharge would be directed to the mine pit lake. Water stored in the Tailings Storage Facility at the end of mining operations would be pumped into the pit. When the pit lake level reaches its maximum design water level of 33 feet below the low point of the pit crest, approximately 60 years after mine closure, water from the pit lake would be treated to meet applicable standards for water quality and discharged to Crooked Creek approximately 52 years after mine closure.

Summary Conclusion

Under Donlin Gold's proposed action, impacts on water flow in the Crooked Creek watershed are expected to be minor to moderate overall, as high-intensity effects such as damming and flow reductions would be limited to the immediate environs of the proposed mine site. There would be only slight differences in water flow effects among the alternatives as compared to Alternative 2. Water flow reduction would affect waters adjacent to and downstream of the proposed mine. Flow reductions would stem from the fact that surface runoff in many parts of the mine site area would be diverted and captured (stored), and groundwater would be dewatered from the pit, during the operations and maintenance phase. Estimated habitat losses from flow reductions in Crooked Creek can generally result in adverse impacts to both the availability of suitable spawning areas and the viability of fish egg incubation. Because reductions would be most extreme during winter, they are not expected to significantly affect salmon spawning, or juvenile success upstream of the proposed mine. Water management practices at the mine site would be required according to mandated permitting, and would help to avoid or mitigate effects on downstream aquatic habitat.

Note: This topic poster is designed to give a general overview. More information on Water Flow can be found in the Draft EIS, Sections 3.5 - Surface Water Hydrology, and 3.6

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

Native Village of Aniak
Knik Tribe
Akiak Native Community

Photos: Dave Cannon