

## MEMORANDUM

To: Vista Gold, John Rozelle

From: Ken Rippere

Date: 29 August 2019

Subject: Response to NT Regulators regarding Stability of Pit Walls wrt the Waste Rock Dump



In their review of the POO for the Mt Todd project, the Regulators have raised a question concerning the impact the adjacent WRD might have on the stability of the ultimate pit wall at Mt Todd. The apparent issue here is that the WRD represents a surcharge on the pit wall rock and how might that affect the stability of the pit wall? The bottom line is that while additional loading will occur, it will not affect the stability of the pit wall.

Wall failure is assumed to occur in shear: i.e., the driving forces along a given surface will exceed the available resistance. As there are no known weak geologic structures, such as faults, with both the location and orientation that might be involved here, failure through the rock mass itself must be assumed. The rock material at Mt Todd is uncommonly strong.

The analysis performed to assess this situation is based on classic soil mechanics theory and involves a "circular" slip surface. The more soil-like a material is in terms of strength and texture, the more appropriate such an analysis is. In conducting such analyses, it is quickly seen that the weaker a material is, the more deeply seated the "critical surface" is. As the material increases in strength, the critical surface becomes ever more shallow and, ultimately, involves only the skin of the pit wall. Indeed, it is fair to question the relevance of such an analysis when applied to rock materials.

For the purposes of this discussion, the "critical surface" can be thought of as suggesting the distance behind the pit wall within which changes in surface loading would influence pit wall stability. Because there is effectively no soil cover at Mt Todd, this distance is defined entirely by the strength of the rock mass. The uncommon strength of the Mt Todd rock mass, as well as the incorporated structural fabric, allows the steep pit wall recommendations. Accordingly, it is only the zone within a few meters of the pit crest that might be of concern. The WRD will be well outside of this zone.

The WRD, as designed, is set back a minimum of 60 meters from the ultimate pit crest. The WRD then rises in lifts at an overall angle of 34 degrees away from the pit. Furthermore, this is a two-dimensional analysis and it ignores any contribution to stability that derives from the curvature of the pit wall which will be significant in this case.