
**Landform Design for Pilbara Mine Site – Why Plan and Design Waste Rock Dumps for Closure Based on Site-specific Conditions?**

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**Abstract:**

The mine site is situated south east of Port Hedland in the Pilbara region of Western Australia. A detailed engineering design was undertaken for six irregularly shaped waste rock dumps at the site. The design was undertaken to ensure long-term stability of the dumps and optimise material movements for closure construction. The Watershed Erosion Prediction Program (WEPP) and SIBERIA landscape evolution modelling was undertaken for the landforms using regional and site-specific material characteristics to provide an indication of the maximum allowable slopes and corresponding slope lengths for long-term stability.

The majority of the waste materials present in the waste rock dumps are considered likely to be subgrade banded iron formation (BIF) and chert, which is generally competent material. The presence of a large number of dolerite dyke swarms indicates appreciable volumes of dolerite were produced as waste from the pits. Geological records also indicate that the dolerite is logged as being heavily kaolinised in the geological logging, hence kaolinite is very likely to be present within the waste dumps on-site. This material has an elevated risk of being highly erodible/dispersive. Clays and shales are also likely to be present in the dumps and are considered to be less competent material (relative to the BIF/chert).

The final design configuration of the largest existing 'unplanned' waste rock stockpile is compared to a hypothetical continuous ten degree outer embankment alternative. This paper will present a brief description of the alternatives for closure of three waste dumps in close proximity to each other and how the detailed design based on site-specific materials and conditions compare to an alternative approach blankly assuming that most materials will be erosionally stable at less than ten degrees.