

## Project Scope

Bulk Material: Iron Ore Fines  
 Equipment: 42,000 cubic metre conical stockpile with two reclaim hoppers for train loading, Figure 1  
 Problem: Insufficient live capacity due to rathole formation above reclaim hoppers, Figure 2

## TBS Solution

In order to provide a cost effective solution, TBS proposed to keep the existing drawdown hoppers and place hopper extensions above the existing ones to increase the hopper inlet dimension and therefore the dimension of the rathole which forms. Extensive flow property testing was conducted on the many types of iron ore fines to be handled through the stockpile, the results of which were used in designing the hopper extension to promote mass-flow that would ensure that the ratholes which form will have a dimension governed by the hopper inlet dimension rather than the hopper outlet dimension. The flow property results also highlighted that the existing drawdown hoppers would not mass-flow for a number of the ores handled. While this would seem to indicate that the existing hoppers would need replacement to solve the insufficient capacity problem, the hopper extension has been carefully designed to eliminate high surcharge pressures on the existing hoppers, effectively transforming them into transfer chutes rather than hoppers, preventing the formation of stable ratholes within them. The hopper extensions were designed as two plane flow hoppers as shown in Figure 3 with vertical end walls and sloping side walls at the angle required for plane mass-flow.

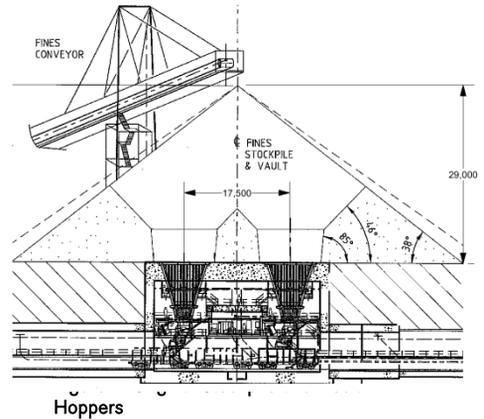


Figure 2: Rathole Formation reducing Live Capacity

## Project Outcomes

Stockpile live capacity has increased by approximately 70%. This has had a dramatic impact on achievable train loading speeds. Prior to the modifications, the train speed was limited to 0.7 kph to avoid running out of ore and now loading can be comfortably maintained at a train speed of 1.5kph. Figure 4 shows a picture of the partially drawn down stockpile after the modifications.

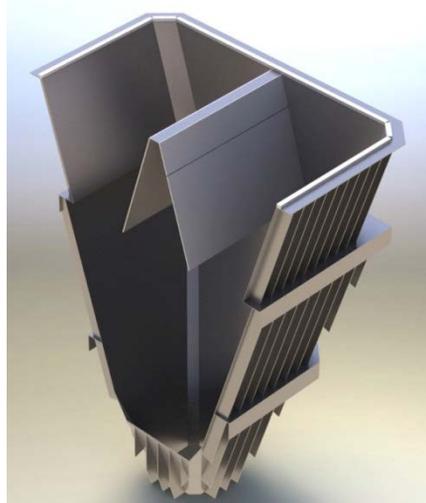


Figure 3: Twin Plane Flow Hoppers Extension above Existing Pyramid Hopper



Figure 4: Post Modifications Stockpile Drawdown

For more information regarding this project or if you wish to make an enquiry, please contact:

**TUNRA BULK SOLIDS**  
Dr Stephen Wiche

Newcastle Institute for Energy and Resources (NIER)  
 The University of Newcastle  
 Off Vale Street  
 Shortland NSW 2307, Australia



Email: [enquiries@bulksolids.com.au](mailto:enquiries@bulksolids.com.au)  
 Ph: +61 2 4033 9055  
 Fax: +61 2 4033 9044  
<http://www.bulksolids.com.au>