

Fingerboards Mineral Sands Project — Inquiry and Advisory Committee (IAC)

Expert meeting statement — Flooding and Hydraulic Assessment

Meeting held *Online Meeting (via MS Teams) – Wednesday 31 March 2021 (9am - 10am AEST)*

Experts: **JW - James Weidmann (Chair), Water Technology. AK - Anthony Kiem, University of Newcastle.**

Observers: **JS - John Sweeney, Coffey. LM - Leon Metzeling, Environment Protection Authority Victoria.**

Note taker: **JW - James Weidmann, Water Technology.**

The following key issues and areas of agreement and disagreement were identified by the participating experts at the meeting:

Item No.	Issue	
1	<i>Consideration of extreme events</i>	
	Matters of agreement	
	No.	Agreed fact/opinion
	1.1	<i>Extreme rainfall events can occur that are outside of what has been modelled.</i>
	1.2	<i>Flooding events tend to be clustered (i.e., back-to-back heavy rainfall events).</i>
	1.3	<i>Long periods of dry weather can be broken by flooding events.</i>
	1.4	<i>The flood modelling undertaken has considered the 1% AEP event and assumes the dam storages are full.</i>
	1.5	<i>Consideration of extreme events should be reflected in the management strategy for the water management dams and site operations to ensure that the mine can deal with these events.</i>
		Assumptions relied upon in reaching agreement
	1.6	
	Individual comments in respect of agreed fact/opinion	

	1.7	Anthony Kiem	Climate extremes beyond what have been modelled are possible in the future and must be considered. There are no issues with the flood modelling undertaken thus far, and additional flood modelling may not be necessary, but more needs to be done to plan for extreme (wet and dry) events. For example, during prolonged periods of dry weather, flood controls may be neglected so something needs to be included in the mine management plans to ensure flood controls are still maintained during drought.	
	1.8	James Weidmann	The flood modelling undertaken has considered the 1% AEP event and assumes the dam storages are full, thus representing extremely conservative flooding conditions. As the flooding assessment was an impact assessment comparing pre and post scenarios, an increase in rainfall intensity would not have affected the outcomes or recommendations. However, separate to the design event flood modelling, mine operators should be made aware that extreme events exceeding what has been modelled is possible.	
		Agreed actions:	Suggested timing:	
	1.9	Acknowledgement to be included in the mine management plans and risk register of the potential for extreme events to occur outside what has been modelled to ensure that mine operators are aware of potential risks. Include a provision in the management plans for maintaining flood controls (spillways, pumps etc) during prolonged periods of drought.	Post approval, during operation phase	
Matters of disagreement				
	No.	Summary of fact/opinion not agreed		
	1.10	Nil		
2	Climate change and climate variability			
	Matters of agreement			
		No.	Agreed fact/opinion	
		2.1	Climate extremes beyond what have been modelled are possible in the future.	
		2.2	Rainfall intensity is projected to increase in the future.	
	2.3	A 5% increase in rainfall intensity would be appropriate given the design horizon of the project and to be consistent with ARR Datahub information, noting that rainfall could vary significantly from this value.		

2.4	<i>In terms of the event-based flood modelling undertaking, a distinction needs to be made that the annual changes to rainfall are very different to potential changes in daily and sub-daily rainfall intensity.</i>	
2.5	<i>Future climate conditions are highly uncertain.</i>	
2.6	<i>Many factors affect flooding conditions other than rainfall intensities, and include (but not limited to) soil moisture content/holding capacity, groundwater extraction, antecedent catchment conditions, evaporation and land use.</i>	
2.7	<i>The effects of climate change will be very catchment specific and will affect regions differently.</i>	
2.8	<i>Pre-1975 rainfall data was implicitly included in the derivation of the Intensity-Frequency-Duration curves (IFDs) produced by BoM.</i>	
	Assumptions relied upon in reaching agreement	
2.9		
	Individual comments in respect of agreed fact/opinion	
2.10	<i>Anthony Kiem</i>	<i>Climate sensitivities need to be considered to ensure the mine is designed for a range of plausible scenarios.</i>
2.11	<i>James Weidmann</i>	<i>Climate change was not explicitly included in the assessment (represented as an increase in rainfall intensity). As the assessment was an impact assessment comparing pre and post scenarios, an increase in rainfall intensity would not have affected the outcomes or recommendations. The flood modelling undertaken utilises a simplified initial and continuing loss model and adopting low losses is a common method of representing worst-case flooding conditions.</i>
	Agreed actions:	Suggested timing:
2.12	<p><i>Any future flood modelling to consider climate change sensitivity assessment using 5% increase in rainfall intensity, noting that rainfall could vary significantly from this value. Future modelling to consider low losses where appropriate to represent worst-case- flooding conditions.</i></p> <p><i>Include acknowledgment in the mine management plans that annual changes in rainfall can be very different to potential changes to sub-daily rainfall intensity.</i></p>	<i>Post approval, during detailed design.</i>
Matters of disagreement		
No.	Summary of fact/opinion not agreed	

	2.13	Nil		
3	Definition of practicable and how to reflect this in the mine management plans			
	Matters of agreement			
	No.	Agreed fact/opinion		
	3.1	The term "practicable" used in the Site Report and JW's expert witness statement may be interpreted differently by different people.		
	3.2	Some clarification needed to be reflected in the Environmental Management Framework to ensure the mine operator adheres to their statutory responsibilities.		
	3.3	Assumptions relied upon in reaching agreement		
	3.3	Individual comments in respect of agreed fact/opinion		
	3.4	Anthony Kiem	Clarification on the term "practicable" should be reflected in the Environmental Management Framework. Decisions about what mitigation options or risk controls are implemented and when to do it should not be based on subjective opinions. Rather there needs to be clear, objectively defined, triggers for implementing mitigation options and risk controls. There also needs to be clear information about what happens if flood controls are not implemented adequately – what are the on-site consequences of flooding/dam failure that occurs because flood controls are not implemented adequately? What happens to the mine operator if flood controls are not implemented adequately?	
	3.5	James Weidmann	"Practicable" should be interpreted by the mine operator by weighing up the severity of any potential injury or harm to health, degree of risk, the availability, suitability and cost of the means to remove or control the risk. That it should be interpreted sensibly and contextually given the nature of sand mining operations (altering landforms).	
	3.6	Agreed actions:	Suggested timing:	
		Include provision in the Environmental Management Framework (EMF) reminding the mine operators of their statutory general duty of care and environmental duty. Include in the EMF clearly defined triggers (to be specified as part of detailed design) for implementing flood mitigation strategies and risk controls (for example water management dam drawdown and inspections of spillways following storm events).		Post approval, during detailed design and operation phase
	Matters of disagreement			
No.	Summary of fact/opinion not agreed			
3.7	Nil			

Prepared jointly by:



James Weidmann

23 April 2021



Anthony Kiem

23 April 2021