



The
Geological
Society

servicing science & profession



South East Regional Group

Meeting

The puzzle of the Gumbasa Flow Slide – An engineering assessment to Build Back Better

By Barnali Ghosh and Ed Russell
(Foundations and Geotechnics, Mott MacDonald)

On 28 September 2018, Central Sulawesi Province, Indonesia, experienced a 7.4 magnitude earthquake, resulting in significant loss of life and damage to dwellings and infrastructure. The 55 km long Gumbasa Irrigation System was heavily broken and irrigation of 8,000 ha of land has failed since then. Through an Emergency Assistance for Rehabilitation and Reconstruction (EARR) grant, Asian Development Bank (ADB) is funding reconstruction for the irrigation canal. Embedded in the concept and design development for reconstruction of the primary canal, Mott Macdonald undertook engineering and sustainability assessments. Particular challenge arose from rare earthquake induced high velocity flow slides and with only basic types of ground investigation technology available for characterisation purposes. Detailed geological understanding of the flow slides led to the segmental risk profiling of the canal corridor and slopes for future earthquake induced failure that suitably calibrated with the actual zones of large flow slides. The differentiating factor between lower and higher risk was found to be combinations of soil layers that exacerbated earthquake induced excess pore water pressures and led to temporary but exceptionally low levels of shear strength.



The presentation will highlight the adopted approach to repair and rehabilitate the main canal using the BUILD BACK BETTER approach guided by the sustainability drivers for the project. The adopted approach and lessons learned can be used in similar settings worldwide. The project has also been submitted for the Ground Engineering Sustainability Award.



The
Geological
Society

servicing science & profession

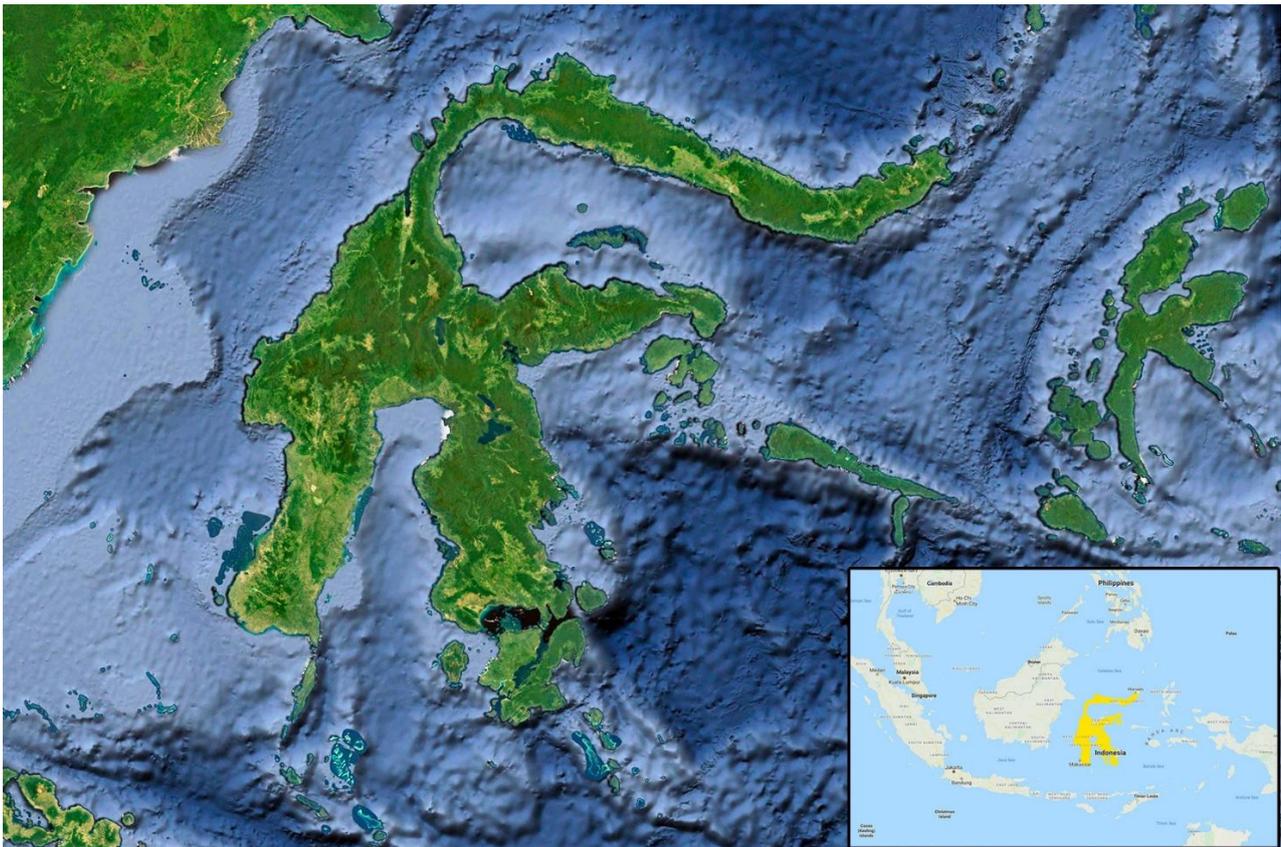
South East Regional Group

Meeting

About the Speakers

Barnali Ghosh is a Technical Director at Mott MacDonald (London) and a Fellow at Institute of Civil Engineer (FICE). She is a chartered civil engineer with specialization in Earthquake Geotechnical Engineering. She was recently selected among the top 50 women in engineering in UK in 2020. She is the International Winner of 2017 Shamsheer Prakash Award for Excellence in Geotechnical Earthquake Engineering Practice. During her long career, she has acted as a seismic designer and reviewer for high-profile projects around the world. She has been propagating sustainable solutions for developing countries which have wide social outcomes. She remains connected to the academic world as a Royal Academy Visiting Professor at Cambridge University where she teaches Geo Seismic Engineering.

Edward Russell is principal engineering geologist experienced in design, supervision and interpretation of site investigations, geological mapping and detailed soil/rock logging. Geotechnical design experience in preliminary and detailed foundation design, embankments, flood embankments, load transfer platforms, slope stability assessment and soil mixing. Experienced in supervision of construction works including tunnel portal excavations and drill and blast tunnelling. Considerable overseas experience gained in Kazakhstan, Turkmenistan, Albania, Georgia, Mozambique and Ireland.



Date: 24 May 2022 **Time:** 6pm [Click here to join the meeting](#)