

### **SMX - Sustainable Mining Explorer Platform: A Geoscience-Based Approach for ESG Risk Management in Mining**

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The exploration, extraction, and processing of minerals significantly interact with the environment and nearby communities, with impacts varying by commodity. Each stage of the mining lifecycle—from initial geophysical surveys and drilling to waste management and mine closure—carries distinct environmental and societal implications. This highlights the increasing importance of Sustainability and ESG (Environmental, Social, and Governance) practices in mining. Although Australia maintains one of the world's most comprehensive geoscientific data collections, this resource remains underutilized in addressing ESG-related challenges, particularly in the context of Critical and, to a lesser extent, Strategic Minerals. Mining strategies directly influence a project's environmental footprint and are increasingly evaluated under ESG frameworks, and briefly outlined in the revised Australian JORC (Joint Ore Reserves Committee) Code.

In response, CSIRO is developing the Sustainable Mining Explorer (SMX) platform, which integrates precompetitive geoscientific data and physical models to assess the social and environmental implications of mining activities. SMX enables users to select a geographic region in Australia, specify a mine type, and explore ESG-related topics to obtain preliminary insights into the potential challenges and opportunities associated with mine development in that area. This abstract introduces the SMX platform and presents its initial results, focusing on two ESG topics from the 'Air' category in Attachment 1 of the JORC Code: Dust Production and Noise, the latter of which has been expanded to include seismic noise.