

ZERO WASTE SUSTAINABLE MINING AND PROCESSING OPERATION OF QUARTZ

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Quartz is a limited resource and there is an increasing demand for it. However, unscrupulous mining practices have crippled the development of many quartz mines in Sri Lanka. This study is on a proposed sustainable mining procedure for Industrial Mining Licence (IML) (category B) quartz quarry and processing unit to maximize the output. For an IML (category B) quarry with a staff of 25, at least 250 tons of quartz lumps per month should be produced to maintain the profitability. It would result in producing 400-500 tons of low-grade quartz and excess soil as byproducts or waste, which depends on the dilution ratio.

The proposed zero-waste sustainable mining process is based on boosting the output value of low-grade quartz, quarry dust, gems and soil. High grade quartz ($\text{SiO}_2 >99\%$) is exported as a raw material and quartz with SiO_2 92% to 95% can be upgraded up to 96% to $>99\%$ pure quartz through leaching. The rest of low-grade quartz is converted to following products, and their value is increased through producing pebbles for landscaping industry, yellow coloured quartz aggregates for fish tanks and manufacturing quartz cement tiles for flooring as well as using for post-mining quarry rehabilitation process, in this study. A cash flow analysis of the pilot project has also been done under this concept, which has produced some positive outcomes.

Keywords: quartz mining, value addition, quarry rehabilitation