

## The University of Queensland - IIT Delhi Academy of Research Joint PhD Project

<b>Project title</b>	<b>Utilization of Mining Wastes as Backfill Material for Mechanically Stabilized Earth (MSE) Walls</b>
<b>Project code</b>	<b>UQIDAR 00230</b>
<b>Project description</b>	<p>Generation of mining wastes is a problem that is common to both Australia and India. To support circular economies in both the countries, it is imperative that these by-products are stabilised and reused effectively. One of their potential usage could be as backfill materials that support mechanically stabilised earth walls. Transportation sector in India, especially involving high speed trains, is to witness a rapid growth in the coming decade. To this end, the proposed project will investigate the case where the railway track traverses a stretch supported by MSE walls. The MSE wall and the backfill will be subjected to gravity, atmospheric and dynamic loads due to moving train as destabilising forces. State of the backfill in terms of its placement condition and exposure to seasonal variation in rainy and dry weather will also play a role in dictating the stability of the wall.</p> <p>With the above in mind, the proposed project will involve physical model studies to simulate dynamic loads on MSE walls backfilled with stabilised mining wastes. The model is to be instrumented with sensors to measure displacement, pore water pressure, acceleration etc. to monitor the performance of the MSE wall. Historical atmospheric data for simulating the climatic events is to be extracted from a site where such an arrangement is likely to be built. Performance of the physical model are to be evaluated under dynamic and atmospheric loads.</p> <p>The industrial wastes are to be characterised for their hydro-mechanical properties. The characterisation studies will involve determination of dynamic and unsaturated properties of the backfills. Data from the physical modeling and characterisation studies are to be used as input parameters for validation of a numerical model which will couple with hydro-mechanical response of the wall and the backfill under dynamic and atmospheric load, and under unsaturated backfill conditions.</p>
<b>Project outcomes</b>	<ol style="list-style-type: none"> <li>1. Exploring the potential of reuse of mining wastes as engineered backfills for MSE walls</li> <li>2. Improved understanding of the behaviour of unsaturated mining wastes under vibrational and atmospheric loads</li> <li>3. Design guidelines for assessment of the long-term settlement performance and dynamic stability of MSE walls with mining wastes as backfill material.</li> </ol>
<b>Advisory team</b>	<p><b>UQ Principal Supervisor</b> <b>Professor David Williams</b> Civil Engineering d.williams@uq.edu.au <a href="http://researchers.uq.edu.au/researcher/248">http://researchers.uq.edu.au/researcher/248</a></p> <p><b>IITD Principal Supervisor</b> <b>Associate Professor Bappaditya Manna</b> Civil Engineering bmanna@civil.iitd.ac.in <a href="http://web.iitd.ac.in/~bmanna/">http://web.iitd.ac.in/~bmanna/</a></p>

	<b>Additional Supervisor(s)</b> <b>Dr Partha Narayan Mishra</b> <a href="https://www.civil.uq.edu.au/mishra">https://www.civil.uq.edu.au/mishra</a>
<b>Type of student Discipline background of student</b>	Applications are open to: I or q students who meet <a href="#">eligibility criteria</a> .  Ideally, this project requires students with a background in: Geotechnical Engineering, Geoenvironmental Engineering, Structural Engineering, Civil Engineering
<b>Ideal candidate</b>	<b>Essential Capabilities:</b> Knowledge in geotechnical, geoenvironmental engineering, soil dynamics with high grades in academics.  <b>Desirable Capabilities:</b> Experience in experimental/model testing and/or numerical simulations. English proficiency. Knowledge in soil dynamics and geoenvironmental engineering. In case the student does not have the relevant experience, the student will be encouraged to undertake  <b>Expected qualifications (Courses/Degrees etc.):</b> Masters Degree in Geotechnical Engineering or a related discipline.
<b>Application process</b>	Apply online by the due date: <a href="https://www.uqidar.org/students/how-to-apply/">https://www.uqidar.org/students/how-to-apply/</a>