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## **Assessment of Liquefaction Potential of Allahabad, India: A Future Smart City**

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### **Abstract**

In the present work, seismic hazard assessment is performed for Allahabad city in terms of LPI (Liquefaction Potential Index) for a hypothetical earthquake along the Allahabad fault of magnitude Mw 6.7 for different surface Peak Ground Acceleration (PGA) levels (0.06 g, 0.1 g, 0.15 g and 0.2g). Factor of Safety against liquefaction (FS) has been estimated using modified Semi-empirical process from Idriss and Boulanger (2006) for all depths of 116 boreholes across Allahabad. Estimated FS values are used for computing LPI (deterministic) values. Liquefaction potential hazard contour maps are shown in terms of spatial distribution of FS and LPI indices. It is observed that a large part of Allahabad is safe against FS for lower PGA values (0.06 g and 0.1 g) but has a potential to liquefy under high intensity shaking of 0.15 g and 0.2 g PGA at depth 15 m or more. In terms of LPI, most places have 'Low' to 'Very low' liquefaction severity (i.e. LPI<5) for (0.06 and 0.1) g. It gets modified to 'High' (i.e. LPI *b/w* 5 to 15) for (0.15 and 0.2) g at Naini, Jhalwa, Sangam area, near Railway station and Jhunsi region.

**Keywords:** Liquefaction, Cyclic stress ratio, Peak ground acceleration, Lateral spreading, LPI