



## Behavior of Monopiles for Offshore Wind Turbines in Clayey Soil for Gulf of Khambhat Region

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### Abstract

The FOWIND consortium performed various feasibility studies to establish initial pathways for assessing the development of offshore wind power in Gujarat and Tamil Nadu, India. It paved the way for the researchers to investigate further the viability of various Offshore Wind Turbines (OWTs) elements. A 200 MW project titled FOWPI (First offshore Windfarm project in India) is planned in Zone-B off the coast of Pipavav port in Gujarat to demonstrate the risk issues involved before the large-scale implementation of offshore wind farms. This paper presents the development of a three-dimensional finite element model to simulate the monopile foundation of OWTs subjected to monotonic loading for the soil conditions of the Gulf of Khambhat. Soil properties are considered for the clayey soil obtained from the geotechnical investigation done for the LIDAR platform established at the site. Feasibility studies under FOWIND suggested three rating turbines of 4 MW, 6 MW, and 10 MW. Therefore, the current study considered the structural dimensions and material properties of monopiles for these three turbines. Response of all three monopiles has been evaluated for the service-ability limit. Further, p-y curves are developed for the monopile of each turbine, which is then compared with the conventional and recently developed p-y methods.

**Keywords:** Monopile, Offshore wind turbine, Monotonic loading, Finite element modelling