GROUND TECHNOLOGY

Coldham Windfarm

We were commissioned by RGC Civil Engineering Limited (RGC CE) to carry out Site Investigation works for the design and construction of foundations and temporary works for seven, 2 Megawatt wind turbines, at Coldham in Cambridgeshire.

Our initial desk based study and geotechnical risk assessment highlighted the presence of thick sequences of low strength and highly compressible soils beneath the site. A piled solution for the turbine foundations would be required. However, either a piled or ground improvement solution would be needed beneath cranes to mitigate the risk of unacceptable levels of ground deformation during construction.

Minimizing construction costs for temporary crane hard standing and access roads was vital to the feasibility of the project. In order to value engineer these elements, we worked very closely with the RGC CE engineering team to develop and design a suitable ground investigation to sufficiently characterise the behaviour of the low strength highly compressible soils. Our ground investigation information was also needed to confirm pile design parameters for the turbine foundations.

A phased investigation approach was undertaken. A series of CPTu (piezocone) tests to 18m depth at 3 locations beneath each proposed turbine was initially utilised. Detailed analysis of this information enabled further intrusive exploratory works to be designed to maximize additional ground information, and also to enable specific soil horizons to be targeted and sampled.

Cable percussive boreholes, in conjunction with high quality thin walled piston sampling and in-situ vane shear strength testing were undertaken through the marine alluvial layers, while routine standard penetration testing and undisturbed sampling was undertaken in the underlying competent granular and cohesive strata.

Subsequent laboratory testing was undertaken on the high quality samples to provide soil parameters for bearing capacity and settlement analysis of the near surface soils, and of the deeper competent cohesive strata to confirm strength parameters for pile design for the turbine foundations.

The site investigation information highlighted the existence of a stiffer surface crust, with an underlying very soft, highly compressible layer of organic rich cohesive material.

Based on the results of detailed bearing capacity and settlement analysis, crane hard standings were designed to limit the stresses imposed on the soft compressible layer to keep short term settlement within tolerable limits. Large diameter plate bearing tests were subsequently undertaken at various critical depths and locations within the soils profile to help confirm the settlement analysis and refine the ground parameters assumed from the SI data. This enabled the crane hard standing to be validated and give confidence in the short-term settlements likely to be experienced by the cranes under the short-term maximum working loads.