

# Roos Wind Farm, Humberside. Civil and Ancillary Works

## Project Profile

**Client:** Renewable Energy Systems (RES)

**Designer:** JNP Group

**Value:** £6.3m



Design and Construct contract for Civil and Infrastructure Works for a 9 turbine wind farm site constructed in a low lying area of farmland near the village of Roos, between Hull and Withernsea, in the Holderness area of East Yorkshire. The wind turbines procured for the site were Vestas 2.0 MW units.

Approximately half of the site is underlain by soft marine alluvium up to 18m deep which required an extensive site investigation, geotechnical analysis and design process to enable development of approved solutions for roads, crane hardstanding, piling platforms and turbine base piling to ensure compliance with the strict specification and validation requirements set by client RES and the turbine supplier Vestas.

We were assisted in the development of these solutions by JNP geotechnical engineers, geo-synthetics suppliers, piling contractor Simplex Westpile and ground improvement specialists Vibro-Menard.

Construction work included;

- 5km of stone site roads and turbine spurs together with 9 nr 40m x 28m crane hardstandings.
- The site roads in the area of low strength marine alluvium were stabilised with 2 layers of geo-grid.
- Of the 9 turbine foundations, 5 are located in the area of poor quality marine alluvium soils requiring deep piled foundations.
- 4 of the 5 piled foundations required 24 nr x 25m long 600mm dia CFA piles, the 5th base in the area of deepest marine alluvium required 30 nr x 30m long 750mm dia CFA piles constructed in 2 concentric rows.
- Pile designs were based on Eurocode requirements for the specified tension, compression, cyclical loadings and fatigue analysis.
- The associated 5 crane hardstandings in the area of marine alluvium required extensive ground improvement completed using the Combined Modulus Column (CMC) system by Vibro-Menard.
- The stone crane hardstanding load transfer platforms were constructed over the CMC improved subsoils and reinforced with a layer of bi-directional geo-grid to provide safe working platforms for the large turbine erection cranes.



# Roos Wind Farm, Humberside. Civil and Ancillary Works (Cont'd)

## Project Profile

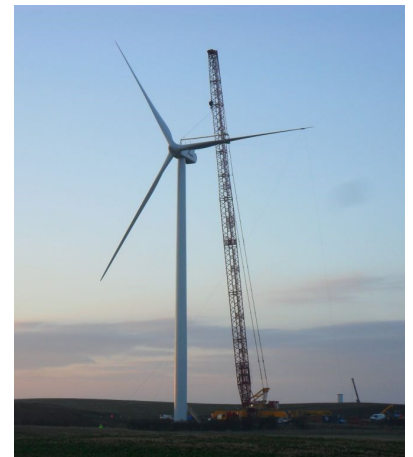
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- Construction of 4 nr x 16m dia gravity reinforced concrete turbine bases in the area of competent glacial till and 5 nr x 17m dia bases on the CFA piled foundations.
- The turbine tower holding down bolt sets were fabricated on site using templates and precisely positioned within the reinforcement cage.
- Each turbine base required fixing of 30 tonnes of reinforcement and between 270m<sup>3</sup> and 380m<sup>3</sup> of concrete which was completed in two pours, the main base pour followed by a 24m<sup>3</sup> 'neck' pour.
- Provide a sustainable drainage system to the whole site including;
  - ◇ 6km of profiled swales with check dams and settlement ponds
  - ◇ 2 flood compensation and ecology ponds
  - ◇ Swale outfalls to existing drainage board controlled 'Field Drains' and 'Main Drains' with associated gabion headwalls and flap valves
- Construction of a 25m x 13m control building which was built over a 1.5m deep reinforced concrete substructure which provides space for the power and SCADA cables. The building was traditionally built in brick/block and slated pitched roof and houses transformers, Scada room, control room, stores and welfare facilities.
- Re-soiling and seeding of road and crane pad margins.
- All surplus topsoil and excavated were retained on site in specifically identified landscape areas.
- An unusual aspect of the scheme was that a significant area of the site had been identified as being part of an old bombing and artillery range and required extensive UXO surveys both at surface for roads and hardstandings as well as penetrative surveys for the piling and ground improvement works at 3 turbine locations as bomb penetration was potentially up to 16.5m deep.
- A 100m deep water supply borehole was installed to service the control building which was completed by our in-house drilling teams.



The site is in a sensitive ecological and archaeological location and during road and crane pad excavations Archaeologists kept a watching brief.