

Higher Micklehurst Wind Turbine, Burnley

Client: Kinetica Energy Ltd

Period: May—August 2014

Value: £300k

Designers: Mineworkings Treatment: Johnson Poole & Bloomer

Civil Infrastructure: JNP

SUDS: McCloy Consulting

We were appointed to undertake the mine workings stabilisation and civil engineering infrastructure work for a single wind turbine development located near Burnley, Lancashire. The EWT DIRECTWIND 52/54—900kW (geared to 500kW) Wind Turbine generator has a hub height of 40m and is capable of generating between 1500—3000MWh/yr.

The site had significant geotechnical and topographical challenges including historic coal mining and substantial thicknesses of tipped colliery spoil which had a significant influence on the design and construction solutions.

Main work has included;

- A 700m stone access track was constructed to connect the turbine location with the A682 Manchester Rd
- The turbine foundation and crane hardstand footprints were underlain by shallow coal workings which were consolidated by drilling & grouting with PFA/cement grouts to a depth of 20m BGL in advance of civil works
- Drilling was carried out on a 6m grid with secondary holes completed dependant on grout take. The proposed pile positions were also check drilled and grouted
- The colliery spoil made ground was removed in the location of the 35mx15m crane hardstanding due to its poor engineering quality (up to 4m deep) and the hardstand formation built up using 1800m³ of imported 6F5 structural fill and 260m³ of Type 1 stone placed to form the final hardstanding surface. The excavated colliery spoil was placed locally and re-graded to suit the topography
- The turbine base slab sits on 9nr 370mm diameter piles installed to a depth of 22m with a centrally placed 32mm full depth dywi-dag bar and a 6m reinforcement cage in the upper pile section which is tied into the base slab.
- The rotary cased piles were installed using a 'dual head' Casagrande M9 drilling rig with simultaneously drilled casing taken to full depth to ensure hole integrity due to the difficult ground conditions
- The piles are designed to withstand compression, tension & cyclical loadings in the range of 975kN to -375kN
- The pile depths were dictated by a requirement to found the piles below the pavement of the treated coal workings
- The base slab is a 7.2x7.2x1.5m thick pile cap with an integral 3.5m dia. turbine anchor 'can' cast-in place and containing 8.0Tonnes of reinforcing steel and 78m³ of an RC40/50 structural concrete.



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- The base is designed to withstand the aggressive ground conditions (DC-3z) for a minimum of 50yrs
- The project is completed with SUDS design capable of dealing with a Q100 rainfall and consists of 70m of 750mm poly pipe land drain, 60m of French drain, 160m of swales and a series of gabion basket structures for headwalls and catchment ponds
- The turbine is connected to the National Grid via a transformer and 750m of HV cable
- All work on the site including mine workings treatment and turbine base piling was carried out with our in house civil and ground engineering resources

