

# Westerdod 132kV Substation

**Client:** Scottish Power Energy Networks

**Location:** East Lothian, Scotland

**Value:** £1.2m

**Duration:** 17 Months



## In Brief...

To facilitate the connection of the new Aikengall II Windfarm, the existing Crystal Rig 400/132kV Substation in East Lothian needed to be extended. This was done through the construction of a new 132kV substation at Westerdod and the installation of a 132kV cable between both substation sites. Barhale were engaged by Iberdrola Engineering and Construction (IEC) to deliver a new control building and all associated civil works.

## Technical Features...

The Barhale team were tasked with delivering all civil works associated with the new 132kV substation; prior to the installation of all electrical equipment by a third party 'Balance of Plant' contractor.

This involved:

- Construction of a new 7.5 mile access road, consisting of 4 miles of bitumen surfacing followed by 3.5 miles of hard-core surfacing
- The complete construction of a new, steel framed control building
- All reinforced concrete foundations for the new 400kV switchyard equipment
- All drainage and ducting installation
- Installation of an underground earthing grid
- Up-filling the platform level
- The erection of a new palisade fence perimeter to the control building

The substation building itself incorporated a reinforced concrete slab, surrounded by concrete bases, which supported a structural steel portal frame on to which purlins and a subsequent aluminium façade cladding was installed.

Within the substation building, a full fit-out package was required, which involved

- the installation of M&E cable trays and trunks
- distribution boxes
- kitchen and WC
- installation of a raised floor system and fire-proof block walls

Barhale delivered several design and build elements of the work, including

- structural steelwork
- cladding
- fencing
- doors and raised floor system

In line with eco-friendly engineering, the substation also incorporated a Rainwater Harvester & UV Filtering System to catch rainwater and recycle it for safe use through the buildings water supply through the taps.

### Extreme Weather...

Situated 3km into the hills at Innerwick, almost 400m above sea level and up a single track forest road, it was always likely that this project would test the resolve of our site team. Add to this the wettest winter in Scotland's history and heavy snowfall until late April however, and the task became herculean.

The extreme weather left the site inaccessible to delivery vehicles for certain periods throughout the programme. In fact on occasion the access routes even proved too treacherous for the 4x4 vehicles used by the site teams. By collaborating closely with both IEC and Scottish Power Energy Networks (SPEN), Barhale's project team were able to develop a revised programme, which took the poor weather in to account, allowing the team to overcome the delays and devise a realistic completion date.

To combat the harsh weather, Barhale's project team incorporated critically important winter working provisions. These included:

- Daily monitoring of future weather forecasts to ensure concrete pours and machine lifts could go ahead in accordance with the programme
- Using heated aggregates in concrete mixes
- Concrete pours and block-work mortar works were cured under the protection of electrical blankets and blow heaters as opposed to frost blankets, which are used more typically

Emergency provisions for winter working also had to be allowed for to provide a contingency against the severe winter conditions, should any site personnel become trapped on site. Fortunately, these provisions were not required during the contract.

### Customer Benefits...

Throughout the challenges encountered at Westerdod the team collaborated with the client to develop practical mitigation measures and realistic programme dates. Despite the weather conditions, the project was completed to a good standard and enabled the power up of the wind-farm.

Barhale also assisted the client by providing several specialist design and fabrication solutions to aid the design requirements.

Barhale Project Manager Saif Khafaji commented:

*"Despite the odds being heavily stacked against the construction team, the project overcame the multiple challenges it faced before being handed over to a satisfied client."*

